J. B. Tyrrell Esqre
With the Compliments of
Dr. Robert Bell
11th March 1907.

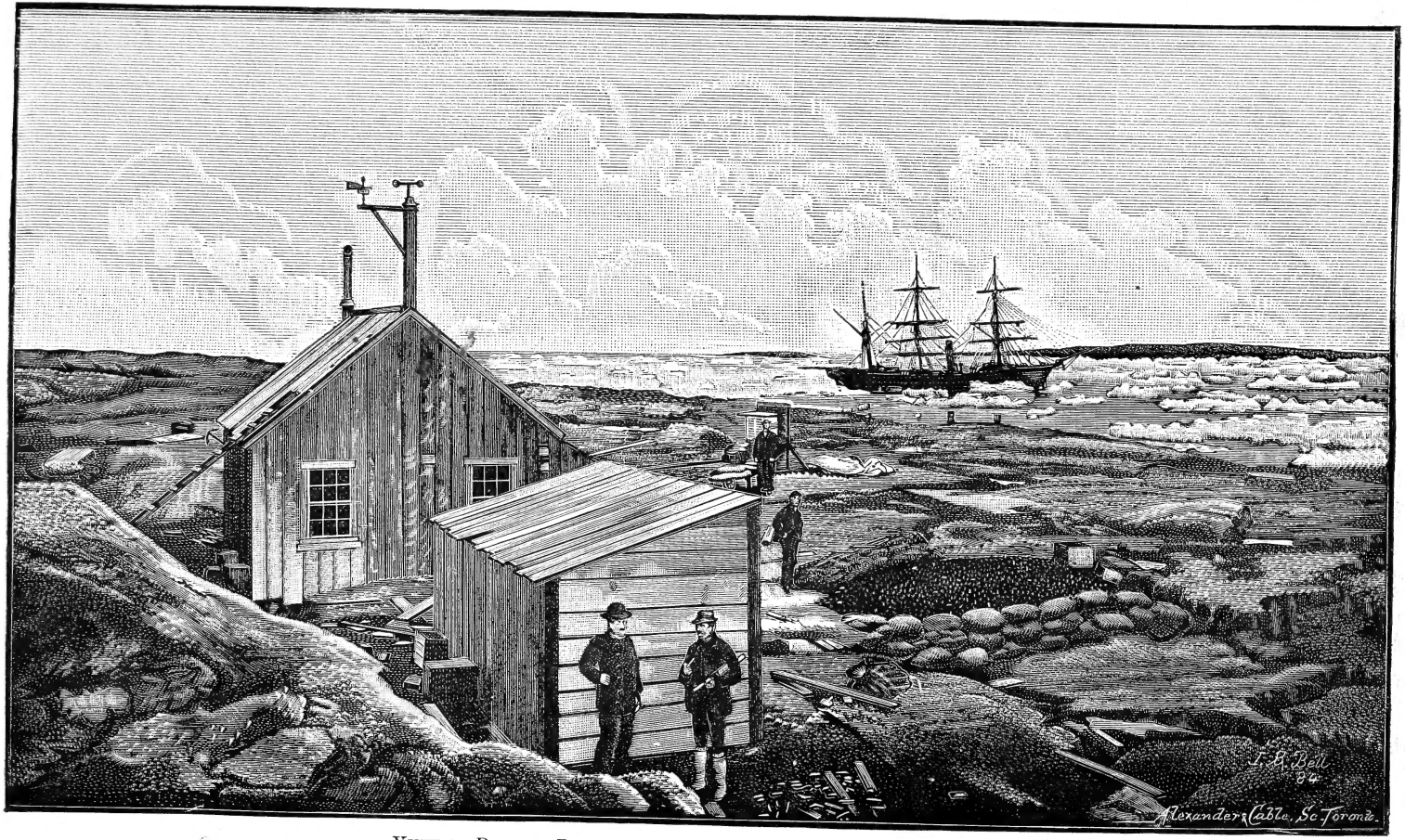
REPORT

OF THE

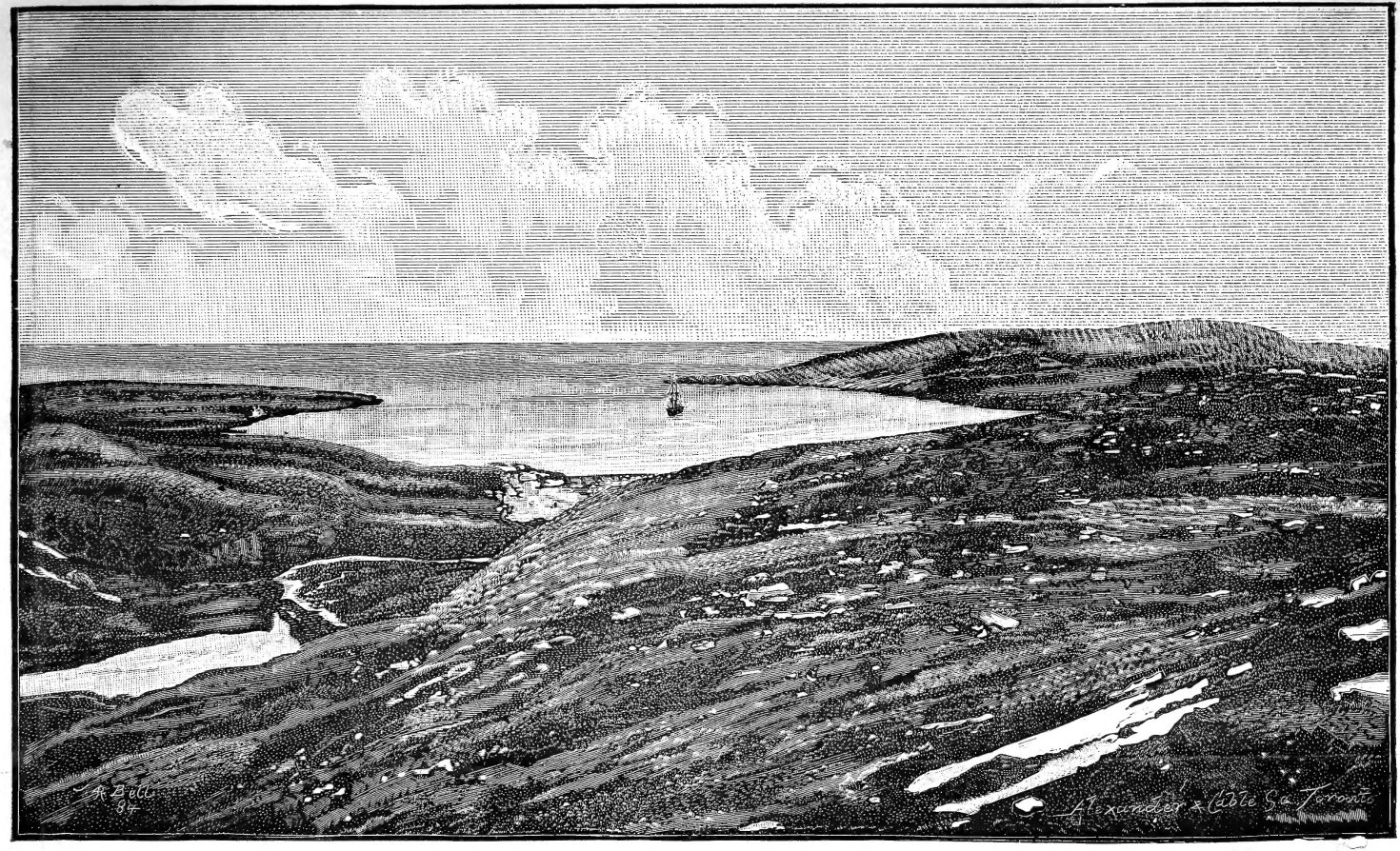
HUDSON'S BAY EXPEDITION OF 1886

UNDER THE COMMAND OF

LIEUT. A. R. GORDON, R.N.

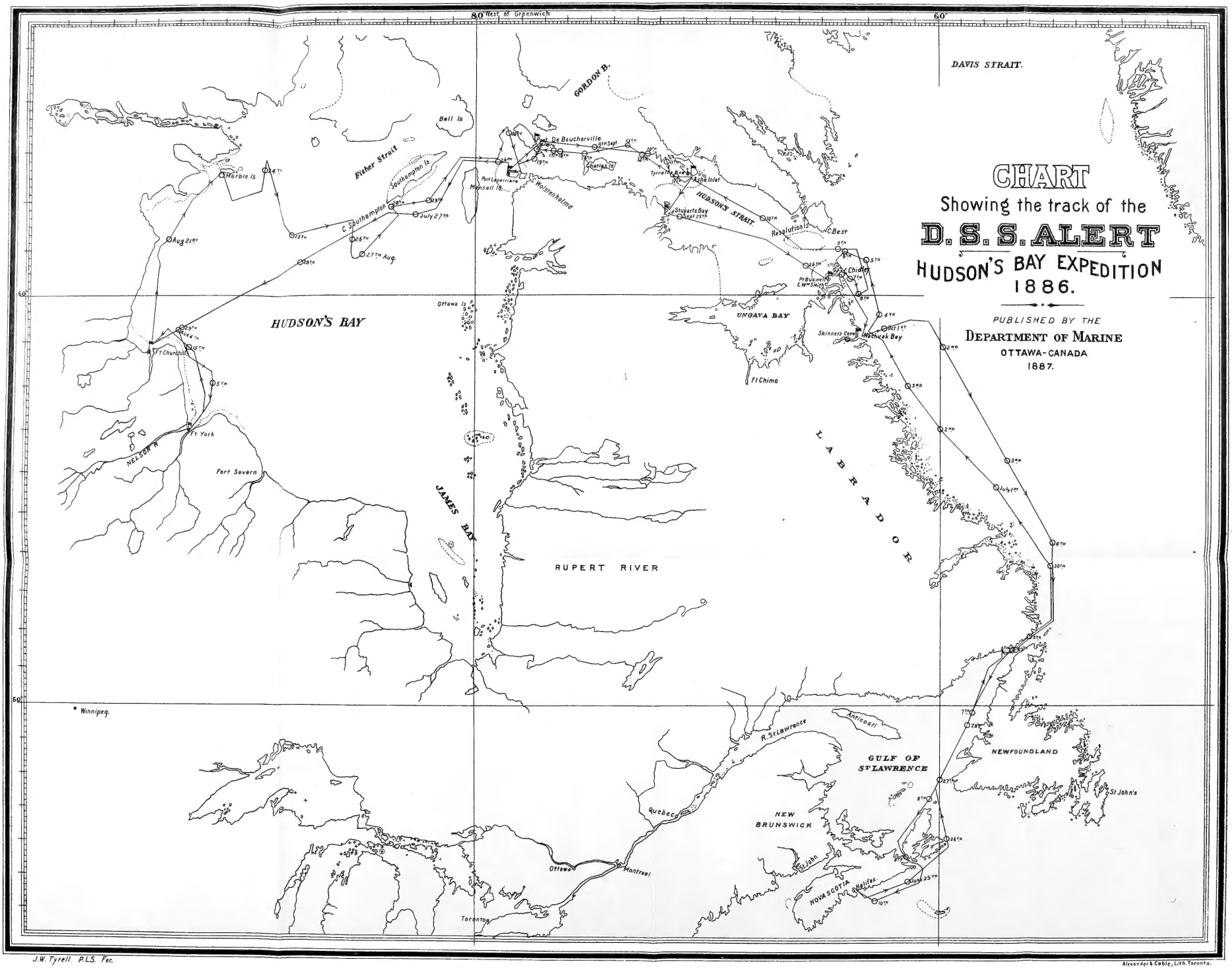


View of Port de Boucherville, Nottingham Island, August, 1884.
From a Photo. by Dr. Bell, Geological Survey. Published by permission of Prof. Selwyn, C.M.G., Director.



View of Port Laperriere, Outer Digges Island.

From a Photo. by Dr. Bell, Assistant Director of the Geological Survey. Published by permission of Prof. Selwyn, C.M.G., Director.



J.W. Tyrell. P.L.S. Fec.

Alexander & Cable, Lith. Toronto.

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HUDSON'S BAY EXPEDITION OF 1886,

UNDER THE COMMAND OF

Lieut. A. R. Gordon, R.N.

TORONTO, 18th March, 1887.

The Hon. GEO. E. FOSTER,
Minister of Marine and Fisheries,
Ottawa.

SIR,—I have the honour to submit herewith the report of the Hudson's Bay Expedition of 1886.

The report is divided under the heads of:—

Narrative,
Ice Observations,
Notes by Observers,
Resources of the Hudson's Bay Region,
Meteorological Observations,
Report by Mr. F. F. Payne on the Flora and Fauna of Stupart's Bay,
Report by Dr. R. Bell on Economic Minerals, &c.,
Concluding remarks on the Navigation of the Straits.

NARRATIVE OF THE VOYAGE OF THE DOMINION STEAMER "ALERT," 1886.

In accordance with your instructions, I left Toronto on 1st June, and after meeting you in Ottawa, proceeded to Halifax to superintend the fitting out of the ship, and the purchase of all the necessary stores, provisions, &c.

On 24th June, all stores being on board, and the crew shipped, I received from you the following letter of instructions:—

"OTTAWA, 22nd June, 1886.

"To LIEUT. A. R. GORDON, R.N.,
"Halifax, N.S.

"SIR,—With reference to the voyage of the 'Alert' and the work to be performed under your charge for the present season, it is desirable that you should be guided by the following instructions, which are intended rather as an index of the general wishes of the Department, than as an absolute direction from which you are under no circumstances to deviate. Changes that may be rendered necessary, by circumstances now unforeseen, and other work than that indicated which may appear to you proper to be done during the course of your voyage, are to be within your own discretion, always bearing in mind the purpose of the expedition, and the time at your disposal.

"It is desirable that you should proceed to the mouth of Hudson's Straits with as little delay as possible, so as to avail yourself of the very first feasible opportunity to make the passage through. If you are prevented from at once entering the Straits, you will occupy your time in taking accurate observations of, the extent and condition of the ice, the prevailing winds, and the currents at its mouth.

"At the earliest possible period consistent with the safety of the expedition you will push through the Straits, in order to demonstrate the earliest date of opening navigation and the time required to pass through the ice, noting carefully all the incidents of the passage.

"Unless necessity exists for visiting any of the stations, of which you will be advised by the system of signals agreed upon, you will not lose any time in visiting them during your outward voyage.

"After having made your way through the Straits and taken all necessary observations, it will be advisable for you to push forward to the western coast of the bay, and employ the time at your disposal with carefully examining Churchill Harbour and the Nelson River, flowing into the bay, taking all necessary soundings and observing the lead of this river up to Seal Island, with a view to ascertaining the suitability of these harbours, for the reception and security of vessels and the purposes of trade.

"In addition to this, any information, hydrographical, geological or with reference to the fisheries of that region, which you can gather, should be as carefully and completely collected as opportunity permits.

"It would be well to delay your homeward voyage through the Straits to as late a period as is consistent with safety and the labour involved in gathering the men and plant of the observing stations, in order to gain whatever data you can as to the condition of the Straits at the latest period of navigation.

"The observers, the houses and all portable and valuable articles at the stations you will take on board the 'Alert' on your return voyage, and bring them with you to Halifax.

"You will bear in mind that it is the wish of the Department to demonstrate as far as possible the navigability of the Straits, for purposes of commerce, in point of time and facility, and anything that will conduce to that end the Department relies upon you to do to the limit of the means placed at your disposal.

"I am, Sir,

"Your most obedient servant,

"GEORGE E. FOSTER."

On receipt of this letter, I immediately prepared for sea, and sailed from Halifax, leaving the Departmental wharf at 3 p.m. on the 24th of June.

There were borne on the ship's book at this date:—

1 captain,
3 mates,
1 meteorological assistant,
1 boatswain,
20 able-bodied seamen,
1 lamp trimmer,
5 stewards and cooks,
2 engineers,
2 oilers,
6 stokers.

Capt Markham, R.N., also accompanied the expedition as the representative of the Winnipeg and Hudson's Bay Railway Company, making 43 persons in all on board at the date of sailing.

We commenced this voyage with every hope of making an early and successful passage of Hudson's Straits, as the news from Newfoundland was that the ice had left the Labrador coast, and that the season, so far as the movements of the ice were concerned, was an unusually early one. Our subsequent experience showed that certainly, all along the Labrador coast, and to a less extent in Hudson's Straits, the season was earlier than last year.

We were hardly clear of Halifax harbour, when a dense fog settled down, which necessitated keeping the engines at half speed, the ship making about 4½ knots per hour; with occasional slight lifts, in which any object, such as a ship, could have been seen at a distance of half a mile to a mile. This fog continued till 5 p.m. of the 26th.

On the 27th we had strong head winds and a heavy sea, against which the ship only made about 2 knots per hour.

On the 28th we had light fair wind, and smooth water, which gave us an opportunity to test the speed of the ship under steam. Working with the expansion gear on, cutting off steam at ⅛ stroke on the high pressure cylinder, and burning 400 lbs. of Welsh coal per hour, the ship made 7 knots per hour; which, considering her then deeply loaded condition, was a most satisfactory result. The quality of the coal was excellent, the ashes were all burned over, and in the six hours' steaming trial, when nearly 2,500 lbs. of coal were consumed, the final ash residuum was only about 220 lbs. This fuel gave, according to this test, a consumption approximity of 4½ tons per 100 miles of distance, so that even if I allowed 5 tons, I felt satisfied that I was carrying coal sufficient for a distance of nearly 8,500 miles in clear water, and as I estimated my total distance for the voyage at about 6,400 miles, the reserve for delays by ice was ample.

On the 29th, at 8.30 a.m., we arrived off Blanc Sablon, and, stopping for a short time, sent away a boat with letters for home. These were given in charge of a boat's crew, employed by Captain Blandford, of Blanc Sablon, who had kindly offered to see to the forwarding of any mail matter which we might at any time leave there. At 9.30 a.m. our boat having returned loaded with a very acceptable supply of fine fresh codfish, we proceeded on our course, keeping close in under the north shore. The day was misty, with occasional showers of rain, but the wind being light and the sea smooth, the speed of 7 knots was kept up all day. At 4 p.m. within our limited horizon, 20 icebergs were counted, most of them aground near the north shore of the Straits.

On the 30th of June, while steaming up the Labrador coast, large numbers of small icebergs, called growlers, were passed, but very few large ones. These growlers are the fragments of large bergs which often break up when they go aground about this part of the coast. All this day we had a fresh breeze from the N.E., with cold weather. The wind was bitingly keen, and it was very noticeable that there was no swell, the sea being as smooth as possible though the wind was strong enough to have raised a fairly heavy sea—about 10 p.m. the sea began to get up, and the appearance of the sky to the eastward, when the weather cleared up in the evening, convinced me that we had been passing to leeward of a considerable body of field ice, which must have extended over 60 miles of latitude, and have been of considerable breadth to have prevented the sea from getting up.

On 1st July, passed the Bull Dog Island about 3 a.m., had a fine fair breeze all day, the ship running eight knots under steam and sail. A number of icebergs were passed to-day, some were very large, one particularly so, towering up to a height of 160 or 170 feet above the sea.

July 2nd. At 7 a.m. the wind shifted to north, accompanied by thick weather and snow showers. Loose field ice was now seen ahead; but, in the then condition of the weather, I thought it best to lie off the edge of the ice till it should clear up. At 7 p.m., tacked ship and again stood to the north; by midnight the wind had abated, and the ship was making good way on her course, having passed the ice which was sighted in the morning. Quite a number of bergs were passed to-day. At 10 p.m. there were nine very large ones, all close together, near the ship.

July 3rd. At noon arrived off Cape Mugford, and met the field ice. It was loose and rotten, the ship making six knots without much yawing; steaming along the coast through this loose ice all day; weather fine and clear.

Sunday, 4th. About 3 a.m. arrived off Gulch Cape, and found the Bay between this promontory and White Bear Cape full of tightly packed heavy ice, through which it would have been impossible to force the ship. I was, therefore, reluctantly compelled to abandon the attempt to call at the Nachvak Post, and, heading the ship out to the eastward found comparatively clear water about fifteen miles off the land, when course was altered to the northward, for the entrance of Hudson's Straits.

Monday, 5th July. The weather set in thick, a dense fog hanging over the land; at one time the ship was closely beset for a couple of hours, the ice having run tight together with the tide. While the ship was fast, I had the thickness of a number of the pans measured, they ranged from 5 to 12 feet; occasionally pieces of much greater thickness were met with, but the extra depth in these cases was due to the "rafting" or piling of pan on pan, a process which is almost continually in operation whenever the ice takes against the shore, or against other ice, under the influence of wind or tide.

July 6th. The weather continued thick all day till 4.30 p.m., and no progress was made, ship being beset most of the time. Measures of the thickness of the ice were again made; one piece to which the ship was tied up for the great part of the day, was 300 yards by 180 yards, and the thickness measured at many points on its edge averaged 12 feet. At 4 30 p.m. the fog lifted a little; steamed N.W. for 16 miles when it again closed down and we had to stop and make fast to a floe piece.

July 7th. The fog continued till 9.30 a.m, when heavy snow set in, turning to sleet after a short time, the weather clearing again about 11.20 a.m. There was, however, no opportunity for obtaining observations for position, and though the land was sighted close to, the fog hung over it so close down to the water that it was impossible to identify any part of it.

8th. The weather to-day continued thick up till noon, when it cleared up, and showed us that the ship had been carried south, about 30 miles. The soundings taken whilst steaming off the land show a depth of less than 100 fathoms up to 10 miles off shore, a result somewhat unexpected, as the coast here is high and precipitous, at some places rising abruptly from the water's edge to heights of 1,200 or 1,500 feet. At 1 p.m. cast off from the pan to which we were fast, and steaming out to the eastward got into clear water and headed to the northward following the edge of the ice.

9th. At 5.30 a.m got round the northern edge of the ice and entered Hudson's Straits at 6 a.m. The fog again shut down densely thick; this continued with an occasional lightening up till noon, when the weather cleared for a short time, but only to shut down again. All this day we have been passing heavy loose ice, steaming either half speed or dead slow.

10th. Another foggy morning, but clearing up for good at 7 a.m. At 9.30 a.m. met a stream of loose ice extending north and south as far as could be seen; at 10.30 a.m. got into perfectly clear water and shaped course for North Bluff. All this day heavy ice was visible lying to the south of our track, the late northerly winds having apparently packed the ice down on the south side of the Strait. A shift of wind to the southward would speedily have brought it back and checked our progress. We saw to-day the first "right whale" of the season.

11th. Arrived at Ashe Inlet at 4.55 a.m., and found Mr. Tyrell, P.L.S., the observer in charge, and his assistants, Messrs. Mills and Creelman, in excellent health; they had been plentifully supplied with fresh meat by the natives all through the winter, and had a large quantity of fuel still unused. I took Mr. Tyrell on board as surveying assistant, leaving Messrs. Mills and Creelman to carry on the observations, and proceeded to sea again at 6 a m. Mr. Tyrell informed me that the SS. "Arctic," Capt. Gay, owned by the Messrs. Stephen, of Dundee, had arrived at his station on the 5th of June, being then three weeks out from St. John's, Nfld.

I have since heard from Capt. Guy, and the accompanying ice chart shows the track he followed.

On the 25th May, when to the east of Monumental Island, the "Arctic" was beset by the ice and carried helplessly round Resolution Island, only being set free on the 2nd June, when near the Lower Savages Island, and this, though she is one of the most powerful of the Dundee whaling fleet. This is the same region in which the "Alert" was caught last year, her drift being shown in the chart accompanying the Hudson's Bay Expedition Report, 1885.

Capt. Guy stated to Mr. Tyrell that he intended on leaving Ashe Inlet to, if possible, proceed westward through Hudson's Straits, and to pass between Mansell and Southampton Islands, then to cruise in Hudson's Bay, and passing up the Roe's Welcome, to go through Frozen Strait into Fox Channel, thence through Fury and Hecla Straits into the Gulf of Boothia, and home by Lancaster Sound. Capt. Guy, in fact, reached Repulse Bay on 1st August, but found Frozen Straits fast the whole summer, and had to return by way of Hudson's Straits.

After leaving Ashe Inlet, I intended going across the Straits to, if possible, communicate with Mr. Payne at Stupart's Bay, but about six miles off the north shore the ice lay in one compact mass, which it would have been useless to attempt to force a passage through. Heading to the westward, I followed the edge of the pack for about twenty-five miles, and as there was no apparent change, and the edge of the ice here trended north, following the lay of the land, I took the pack and began working through.

Events subsequently showed that there lay, at this time, between the ship and the open waters of Hudson's Bay, a body of ice fully 200 miles in width. Much of this ice was very heavy and the sheets of great extent, several were upwards of a mile in length, and though the upper crust of snow was soft and overhung the ice below, the latter was as hard as flint. I had taken the pack, and commenced boring through at this point in preference to following the lead of open water to the north, because I had found previously that near the centre of the Straits, at this point, the ice almost invariably slacks about the turn of the tide for a longer or shorter time. A glance at the chart shows, that as the current flows most strongly westward on the north shore, and eastwards on the southern, with Charles Island right in the eddy between these currents, the geographical conditions are favourable to this movement, whilst to the north or south, once well into the pack, the whole swings with each tide almost as immovable as a single sheet.

Capt. Guy says in his letter: "But after leaving there (Ashe Inlet) we found it (the ice) of a much heavier nature, being from 15 to 20 feet thick * * * and were afterwards steaming between Cape Queen and Charles Island from the 20th June to 25th July trying to get into Hudson's Bay."

Capt. Guy tried too far north at first. Had he worked through on the same track as the "Alert" I think it, judging from the reports of the stations at Nottingham and Digges, not unlikely that he might have got through early in July.

12th. At 1.30 p.m. to-day, whilst ramming at a taut bar of ice, the screw struck a piece of ice, and one blade was broken off. Got propeller on deck and shipped a new blade, going ahead with the engines again at 4.40 p.m. Ice continued heavy all day, slacking off and tightening up again apparently with the phases of the tide.

13th, 14th. Ice continued heavy, and I here quote from my journal of the 14th the opinion then written, which subsequent events only tended to confirm:—

"The ice met with to-night, in my opinion, settles the question of the practicability of the navigation of the Straits; up to this date, at any rate, the Straits are not navigable for this season, because no ordinary ship that could be used as a freight carrier, even if strengthened to meet the ice, could have stood the pounding, which this ship has had this afternoon."

15th, 16th, 17th, 18th. Working as opportunity offered to the westward.

19th. At 10 p.m. got close up to the outer Digges Island, where the station of Port Laperrière is situated, but the shore was lined with heavy ice, the board ice

being still fast to the rocks, and, as the weather was unpromising and the tide about to turn, I hauled off for the night.

20th. This morning, after considerable difficulty, succeeded in getting into Port Laperrière. The ship was tied up for two hours to the shore ice under the lee of a point whilst the running ice was going past at the rate of four knots an hour, occasionally striking the ship heavily. After two hours, the breeze having freshened, the board ice parted from the rocks. Fortunately for us the tide had been running long enough to leave a little open water between the running ice and the rocks, and, slipping the lines, we steamed up this narrow lead and got safely into harbour.

Mr. Percy Woodworth and his two assistants, Messrs. Bissett and Bowditch, who had been at this station, came on board over the ice. They had all enjoyed excellent health, and they reported having spent a pleasant and comfortable winter. Mr. Woodworth stated that the harbour ice had only broken up a few days before our arrival, and it is worthy of note that this occurred nearly a month earlier this year than last year, thus showing that both at the eastern and western ends of the Straits the season was a full month earlier than that of 1885.

The 20th, 21st, 22nd, 23rd, and 24th were spent in harbour here, to enable the engineers to make some necessary repairs to the engines. Observation for position and observations of the magnetic elements were also taken.

25th. At 5 a.m. weighed and proceeded out of harbour, having previously examined the condition of the ice from one of the hills. We were, however, only able to make about nine miles when the ship was closely beset, remaining fast all day, the ice swinging with the tide.

26th. At 7.40 a.m. the ice suddenly ran abroad, and by 9 a.m. we were steaming full speed. Dense fog continued till late in the afternoon, which was most unfortunate, as from the position given on the "Arctic's" track the two ships must have been within a few miles of each other on this day.* At 6 p.m. no ice was in sight, except a few scattered pans on the horizon. As soon as the ship was clear of the ice, the regular series of soundings were commenced, and every possible observation taken to determine with accuracy the position of the ship.

27th.—A little loose and rotten ice was met with this morning, but nothing which in any way interfered with our progress, nor were we at any time seriously delayed by ice throughout the remainder of the voyage. About 7 p.m., passed Cape Southampton, but as the weather was somewhat thick at the time it was not sighted.

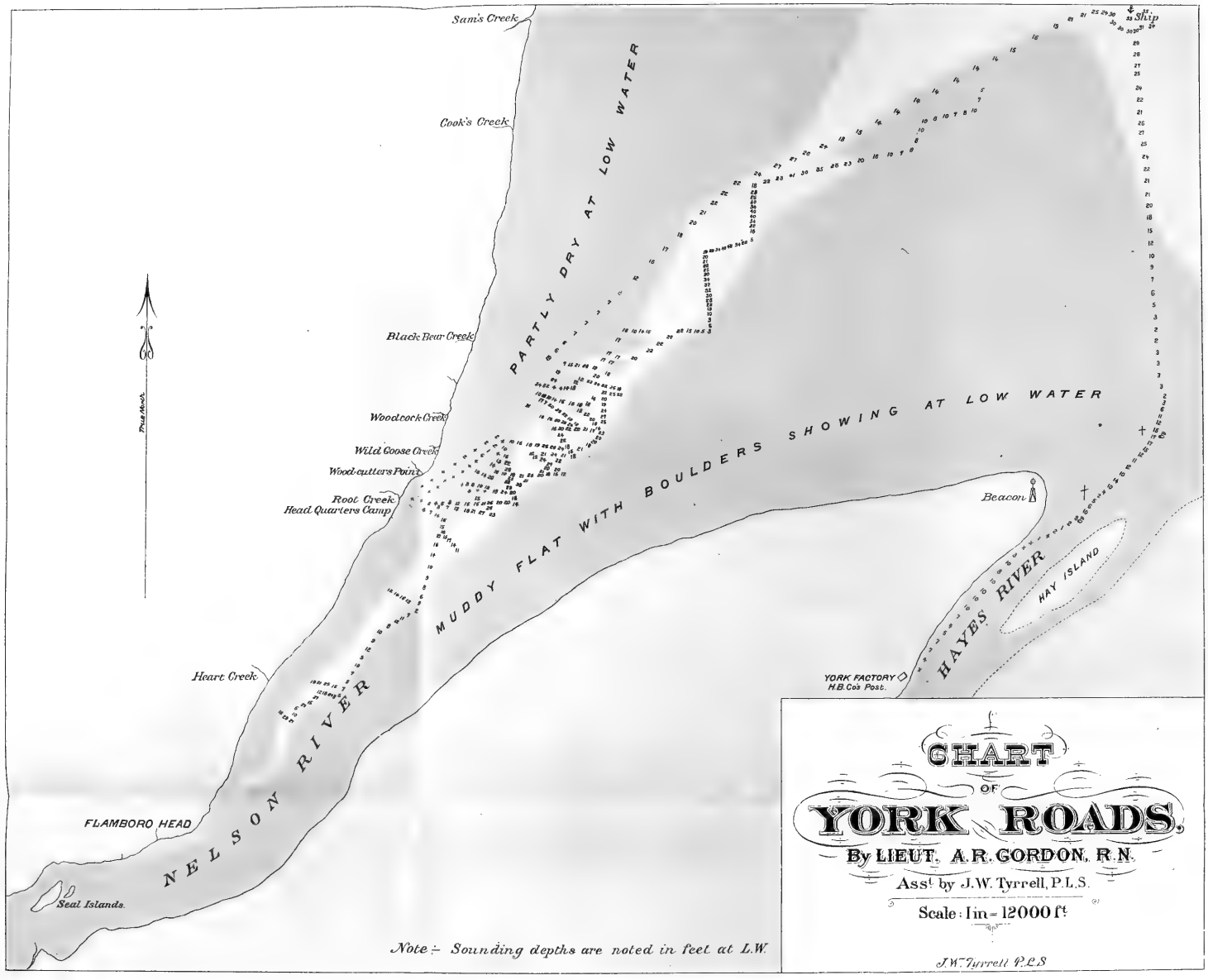
I had now to decide, whether to follow my original intention of visiting the north-west portion of the bay, or to go direct to Churchill and York Factory, to perform the surveying work, which you had desired me to undertake at those places. After careful consideration, I finally decided to make for Churchill, as I was of opinion that the chances of fine weather for this work were more favorable in the early part of August than they would be later on. The run from Cape Southampton to Churchill was an excellent one, the ship making eight knots nearly the whole time. A little loose ice was met with early on the morning of the 28th, but otherwise there was nothing of interest occurred, and we arrived and anchored in Churchill Harbour at 5.15 p.m. on the 29th, having made the run from Cape Southampton in forty-six hours.

From 30th July to 3rd August we were engaged in making a survey of Churchill Harbour, a copy of this plan has been forwarded.

The Harbour at Churchill is formed by the mouth of the Churchill River, which empties itself into Hudson Bay at that angle in the coast lying between Cape Churchill and Seal River. Between these points the older rock formations come right down to the sea,

At its mouth the Churchill River flows nearly north (true). The estuary itself is narrow, being only about 600 yards in width. At this point the tide runs with very considerable velocity—estimated at half-tide to run about six knots. The basin

* Note.—This was written before the final examination of the station records. The "Arctic" was seen passing Digges' Island on the 27th and so was a full day behind us. Captain Guy in dating his track has misdated this noon position.



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for anchorage, with a depth of over four fathoms at low water, is about 1,500 yards north and south, by about 1,000 yards east and west; at two points, leads of from 100 to 200 yards in width carry this depth up for a considerable distance further, and it is in the eastern one of these that I have always anchored.

The holding ground is excellent, the bottom being mud, and though the tide runs very rapidly this harbour is an eminently safe one.

The approaches to Churchill are well marked, and in clear weather the land stands out bold and high, being easily identified at a distance of from ten to twelve miles. In thick weather the rule for making this harbour is to steer in W.b.S., *keeping in 20 fathoms of water*. If shoaler water than this is met with haul up to the north at once, till the water deepens to 20 again. At first the bottom is hard, limestone, coral and gravel. Keep on this W.b.S. course till the lead shows soft mud, when you are in the lead of the river; then alter course to S ½ W., which will bring you right down on Mosquito Point. Keep the lead going, and do not shoal the water to less that ten fathoms. The soft bottom in the lead of the river can be readily distinguished, even at a distance of eight miles from its mouth, and there is no danger in approaching to this distance when the above rules are observed.

This harbour is admirably suited for a railroad terminus. The necessary docks could be easily and cheaply built, and the deep-water basin enlarged at small cost. Stone is lying at the water's edge ready to be laid into docks and piers, and nature seems to have left little to be done in order to make this a capacious port fit for doing a business of great magnitude.

On the 4th of August at 9 a.m. weighed and stood out of harbour for York Factory. On first leaving the harbour soundings were made at five minute intervals, and subsequently throughout the entire trip every half hour. The afternoon being cloudy with a freshening easterly breeze and a falling barometer, I had to keep the ship further off the coast than I should otherwise have done; and though the soundings are thus, perhaps, of less value than they would have been had we been able to keep the coast in sight the whole way, they are still of value as showing the very fair degree of accuracy of this part of the chart.

August 5th. This morning during thick fog came up with a lot of ice, and as the weather continued thick we had to lie off all day.

August 6th. The weather was bright and clear; steamed in for the lead of the Nelson River at daylight, and at 8 a.m. anchored in 5 fathoms of water with the Point Marsh Beacon bearing S b.W. about 10 miles.

Lowered the steam cutter and left the ship for York Factory at 1.30 p.m. with whale boat in tow of steam cutter. Before getting into the Hayes River the breeze had freshened considerably and the cutter shipped so much water that I did not consider her safe for use as a sounding boat in an open roadstead. I therefore made arrangements with the agent of the Hudson Bay Company for the hire of one of their large schooner-rigged boats.

Captain Markham, R.N., who had up to this time accompanied the expedition, as representative of the Winnipeg and Hudson Bay Railroad Company, here left the ship, going to Winnipeg *viâ* the Hayes River canoe route. In accordance with your instructions, I furnished Captain Markham with provisions for himself and party, and procured for him the use of a canoe.

I was now engaged in making a reconnaissance survey of the estuary of the Nelson River. I fixed my headquarters camp at the mouth of Root Creek at a distance of nearly 17 miles from the ship.

Some idea of the difficulties encountered in performing this work may be formed from the following: The ship was lying 9 miles from the nearest land, 17 miles from headquarters camp and 28 miles from the proposed terminus of the railway, yet but little more than a mile from the point shoal, with only 6 feet of water on it, with a tide of nearly 3 knots. The following is the report on the survey made at the so-called Port Nelson:—

Port Nelson is now misnamed, the name being applied at present on the Admiralty charts to the bay lying between Cape Tatnam and the Nelson Shoals. The

name was originally given by Sir Thomas Button to the river itself, the bay into which the rivers flow he called Button's Bay. Sir Thomas Button wintered his ships in the Nelson River near the mouth of a small creek; his winter quarters must have been above Flamborough Head, as he describes the river at that place as being less than one mile wide. Port Nelson was so named after the master of one of his ships who died during the winter. The fact of the name being thus entered on the chart may have led people to believe that some harbour existed at this point. The Nelson and Hayes Rivers here empty their waters into Hudson's Bay, and on the tongue of land lying between the mouths of these rivers is built York Factory, the great *entrepôt*, in years gone by, of the Hudson's Bay Company.

The site was selected by the company, not on account of the existence of any harbour for the security of their shipping, but because the Hayes River was the best boat and canoe route to and from the interior.

Formerly this route was the great, if not the only, means of communication with the early settlers of the Red River and Selkirk Settlements, and it at one time required two ships of considerable size to carry out the goods, not only for the company's trade, but for the use of the settlers. At that time the company's ship did not come in to the fort, but the freight was discharged in the outer roads into schooners, which the company kept in the bay; these took the freight up the river to the Factory, taking out the return cargo in the same way.

Of late years, other means of communication with the North-West Territories having been established, the freight requirements of the company's trade at this post have been much decreased, and for several years past a small brigantine, drawing from 9 to 11 feet of water, has done all the work for the York and Churchill district, and this small vessel has frequently taken the ground both going in and coming out. The outer anchorage in the lead of the Nelson River is ten miles from the nearest land, which is so low as to be out of sight from the deck. The tidal currents at this point runs from two to two and a half or even three knots per hour, the direction varying with the time of the tide. The only distinguishable object is the Point Marsh Beacon, which towers up 80 feet above high water, and without which it would be almost impossible to make the anchorage even in clear weather.

In thick weather a ship must keep right out in thirty fathoms of water, or she may find herself carried in by the tide, when she cannot get out again.

A shoal (Point Marsh Shoal) extends out for over eight miles, and has less than six feet of water on it; and when it is borne in mind that the surrounding land is uniformly low and level, with no natural features which could be used as leading marks, some idea of the difficulty of taking a ship into this place may be realized.

It is undoubtedly true that a channel does exist in the lead of the Nelson River, but it is both narrow and somewhat tortuous, and would have to be closely buoyed throughout its entire length from the anchorage to Seal Island, a distance of about twenty-seven nautical miles. The Indians say that the channel shifts from year to year, and I have no doubt that their statement is correct.

The mouth of the river from Sam's Creek to Point Marsh Beacon is ten miles across, and the channel at this point less than a mile in width. It narrows opposite Black Bear Creek to about 2,000 feet, and two miles east of Flamborough Head, where the river is still between two and three miles wide, the channel has narrowed to 200 feet.

In order to make a channel and basin capable of accommodating freight-carrying vessels much dredging would have to be done, and besides the 27 miles of closely buoyed channel a lightship would have to be moored some distance from the outer anchorage to enable ships to come in if the weather was partially clear.

A great deal of fog hangs over the bay in the months of July and August, and much delay, if not disaster, would be sure to occur if vessels were to attempt to make this port in anything but the finest clear weather, and as we met a lot of loose ice, which was very heavy, off the mouth of the river on the 5th of August, the lightship could not be placed in position till all danger from this cause was gone.

The cost of the construction and maintenance of a harbour at this place together

with the inevitable risks of navigation in approaching it, even after all had been done that could possibly be done, to render it safe and accessible, would, in my opinion, far outweigh the construction of the necessary additional mileage of railway required to reach the port of Churchill.

The channel which I have been considering is one of 18 feet at low water, which as the rise and fall averages 12 feet, would permit the passage of a 2,000 ton steamer, drawing 19 to 20 feet at half tide, as the distance from the anchorage to the proposed port is so great that a vessel could not afford to wait and go in at the top of high water.

I consider that the estuary of the Nelson River is one of the most dangerous places in the world for shipping to go to. At the outer anchorage the sea in a north-east gale breaks from the bottom, and the captains of the Hudson's Bay ships, if the barometer is falling and the weather threatening, will go to sea in the afternoon and lie off till the weather clears again.

The "Alert" lay in five fathoms at low water with 35 fathoms of chain out, but steam was ready for instant use the whole time and the cable buoyed and ready for slipping. One night during an easterly gale which she rode out at her anchors, Capt. Barrie, my first officer, who was in command at the time, reports, that had it not been for the ship being fitted with tanks and tubes for running oil he would have been compelled to slip and go to sea. The tide carried the oil to windward and kept the sea from breaking over the ship, though she was straining heavily at her chains and rolling the boats to the water all through the night.

I can only now repeat my previously expressed opinion, that the Nelson River is no port, nor would the expenditure of any amount of money make it a desirable place for shipping.

August 14th. Having now completed the survey so far as it was in my power to do so, I left York Factory.

I desire to acknowledge the courtesy and assistance which I received from the officers of the Hudson's Bay Company, both at Churchill and York. At York Mr. Matheson chartered to me one of his large schooner-rigged boats, and also furnished me with an interpreter and two Indian pilots, who had a thorough knowledge of the channel of the river, and thus saved me much time.

August 15th. Steaming round the coast to Churchill, weather fine and clear.

August 16th. Anchored in Churchill at 8 p.m. I had determined to remain here a few days to shift coal, take in ballast, &c., &c., and also to obtain sights for time, which, with these taken here in July, gave me the rates of my chronometers.

When we anchored here this morning, the tide was running out strong, and the chain fouled the anchor stock, the result being that the ship dragged her anchor and took the bottom, at 11.30 a.m.; she sat on the mud till 5 p.m., when, as she floated, I weighed anchor and steaming out anchored again.

We remained here till Friday, the 20th, at 3 a.m., on which day we left for Marble Island, steaming up the western shore of Hudson's Bay, sounding regularly and plotting such portions of the coast line as we approached near enough for that purpose. Eskimo Point was passed as closely as was deemed consistent with safety on the morning of the 21st, and then as the weather was thickening up and somewhat threatening in appearance, headed off for Marble Island. All this night and the following morning had a great deal of trouble with the compasses—the steering compass, a U.S. Navy spirit compass of the best manufacture, and comparatively new, was so sluggish as to be useless, and the Sir Wm. Thompson standard was at times much disturbed, at one time swinging to S.S.W., and staying there for a time, our course then being north (magnetic.)

On the morning of the 22nd the same thing occurred. The disturbance on the night of the 21st was co-incident with the sudden outburst of a very brilliant aurora, that on the morning of the 22nd, happened after sunrise, so that no aurora could have been seen even had one existed. As the sun was shining at the time of the second disturbance, I at once removed all the correcting magnets of the Sir Wm.

Thompson compass, and readjusted it, after which it for a time worked fairly well, though on the occasion of our leaving Marble Island trouble again arose.

22nd. Arrived and anchored in outer harbour at 10 a m. On the Deadman's Island I found a letter from Capt. A. P. Benton, of the bark "Wave," which read as follows:—

"MARBLE ISLAND, 1st August, 1886.

"Wintered in the outer harbour in company with the 'George and Mary.' Had a mild winter, but cold and backward spring, the thermometer not reaching 30° till 19th May. Commenced cutting trenches 18th March, but did not get out till 16th day of June. The 'G. and M.' got out 12th June.

"Cruised all over Hudson's Bay the rest of June and July. Saw only one cow and calf, got her, 145 brls. Spoke 'George and Mary' 16th July, clean, bound to Repulse Bay; she saw one whale but did not get him.

"'Welcome' full of ice; did not see a whale there. On 16th July the ice extended from Whale Point across to Cape Harding. The whale I saw was on 2nd day of July; saw nothing in June.

"In February scurvy began to come on the crew. First natives came to the ship 21st April; bought one deer, afterwards bought five more deer. In middle of May things looked blue. The 28th of May we were sawing ice in nine fathoms of water, and the ice was on the bottom. We used between the two barks nearly forty bomb lances to blow the bottom of the ice out. The pack was fast to the floe, 1½ miles, ever since January; could not do anything with it. The 1st of June the pack broke off from the end of Deadman's Island and afterwards we got along quite well, sawing. The ice in the harbour was 7½ feet thick. Nearly one-half of the crew of both vessels were down with scurvy and the remainder more or less afflicted with it; but we got along quite well after we got out. All are in good health now.

"I leave here to-morrow for a short cruise and home.

"ANTHONY BENTON,
"*Master of the Bark "Wave," New Bedford, Mass.*"

This letter shows that two whaling vessels wintered in Hudson's Bay for the purpose of prosecuting the whale fishery, and as only one had wintered there in each of the two preceding winters it would appear, that the New England whalers have not in any way lost confidence in Hudson's Bay as a whaling ground. Curiously enough the letter omits all mention of the death of one of the sailors whose newly made grave and neat wooden cross is now one of the first objects to meet the eye when landing on the island.

This harbor is very small, and gives no shelter from E. or S. E., but is the best ballasting station that I have found anywhere in either the Bay or Strait. Some idea of it may be gained from a knowledge of the fact that, working with three boats, we took in nearly eighty tons of ballast between 5 a.m. and 3 p m. of the 23rd August. As soon as this ballast was on board I put to sea, the weather having a very threatening appearance and the wind freshening from the S. E. with a steadily falling barometer and a heavy swell heaving into the harbour which as before stated is completely exposed to winds from this quarter.

Observations made here this year confirm those made in 1884, both as to latitude and longitude, and alter the position of the island by nearly the length of itself.

On leaving Marble Island, I intended to go north to Roes Welcome, and to have visited Chesterfield Inlet, but when clear of the land I found a heavy sea, and the compasses were working very badly, swinging through arcs of 80° or 90°, that they were for the time useless, and I had to keep out in the open and wait for clear weather.

The weather continued thick and dirty all day of the 24th, and as the time for taking up the more important work in Hudson's Straits was fast approaching, we bore up for Cape Southampton, though, as events shaped themselves, we were fated not to see it for several days.

August 25th. This morning was clear and fine, and observations for position were obtained, but shortly after noon dense fog set in, turning to rain, and by midnight or early morning of the 26th it was blowing a gale, with the ship lying to, under lower topsails and F. T. staysail; at 4 p.m., blowing very hard, took in the topsails and F. T. staysail and set the main spencer, bringing the ship close up to the wind under easy steam. This gale continued till 8 a.m. of the 27th, at which time the engines were started full speed and the course shaped for Cape Southampton as nearly as the carrying of fore and aft canvas would permit.

28th. This morning was beautifully fine, and at 11.30 a.m. anchored under the Cape and got sights for latitude and longitude. Whilst at anchor here current observations were taken, and the maximum velocity found to be 1½ knots per hour; direction of the flood, west (true).

We left Cape Southampton in the afternoon and made a running survey of the coast, from the Cape to Cary's Swans Nest. I found the Cape considerably out of position, and extensive shoals running out from both it and the Nest.

29th August. The weather was again thick to-day, and by 5 p.m. a dense cloud of fog and smoke had enveloped the ship. This came down at first in showers, lasting fifteen or twenty minutes, and gave rise to very peculiar luminous effects; in the intervals between the showers the daylight was yellow and the water appeared of a pale greenish hue; at 6 p.m. it was so dark that lamps had to be lighted. The night which followed was one of intense darkness, such as I have never before witnessed, the hand held six inches from the face could not be seen, and men walked up against each other on the deck. The smell of smoke was as strong as if the fire had been close to us, and at Stupart's Bay, nearly 300 miles distant, Mr. Payne informs me that the rain water collected on this occasion was much discoloured, and when filtered through blotting paper left a very considerable deposit of dark coloured sediment.

With us at the ship the wind was blowing fresh all night, and we lay to on the starboard tack, allowing her to drift to the northward, but keeping the lead going the whole time. On the morning of the 30th some heavy showers of rain helped to clear the atmosphere, and shortly after daylight Nottingham Island was sighted. This enabled me to determine our position approximately and I at once headed the ship across the Straits for Digges Island. The weather continued thick and dirty all day, but at 6.40 p.m. we arrived safely in Port Laperriére, the barometer still falling rapidly and the wind increasing in force.

On the 31st August and the 1st and 2nd September, the gale continued. On the 31st and 1st it blew so hard that the boats could not work getting off stores, and on the 2nd the boats could only work ballast on the western side of the harbour. All hands were now employed in shifting coals from holds to bunkers, and in getting off ballast and generally preparing the ship for the rough weather of the autumn.

On the 3rd I sent away a party under Messrs. Tyrell and Skymer over to the mainland to finish some coast outlining there and to try and get some fresh venison from the Eskimo who are generally to be found there. The party returned on the 4th, having satisfactorily completed the work, though they had been unable to obtain any fresh meat.

September 5th and 6th. Another heavy gale with a sea heaving into the harbour that makes the ship roll heavily.

The house had now been taken down and brought on board, together with all stores and provisions which were unused, and as the weather continued very unsettled I hoisted the steam launch in on deck and secured it there.

Mr. Woodworth addressed me a letter stating that he had found his supply of provisions ample and of good quality. Inasmuch as during the winter of 1885-86, reports were circulated that the stations were insufficiently provisioned and coaled. I give below the list of fuel and provisions which we took on board for Mr. Woodworth's station, of the other stations, some of them returned more and some a little less.

List of articles received on board from Station No. 6, Mr. Woodworth:—

21	sacks coal, 180 lbs. each.	½	tub butter.
3	barrels pork.	6	cases kerosene.
4	½-barrels do	1	keg vinegar.
2	barrels beef.	15	lbs. evaporated onions.
¼	barrel sugar.	10	do do corn.
¾	do oatmeal.	½	qntl. codfish.
6	sacks flour.	½	bag rice.
1	do beans.	37	lbs. evaporated cabbage.
3	bags bread (No. 1 Pilot).	46	do ground coffee.
1	box soap.	1	box fluid beef.
1	do evaporated vegetables.	35	lbs. tea
2	boxes canned mutton.	3	boxes lime juice.
1½	do do beef.	8	cans peaches.
½	box do pears.	35	lbs. evaporated turnips.
1	do evaporated potatoes.	98	do do apples.
3	barrels No. 1 Pilot bread.	1	box canned pears.
¾	barrel beans.	3	tins mustard.
½	do flour.	40	lbs. currants.
½	do syrup.	1	box cocoa.

The above list shows what was returned unused, and is the best possible answer to the statements which were made, that the stations were insufficiently supplied.

September 7th. At 5 p.m. left Port Laperriére for Nottingham Island, steaming dead slow. At 11 p.m. weather rather foggy; met a lot of loose ice, off the edge of which we lay till daylight.

September 8th. At daylight sighted Nottingham Island, and at 8 a.m. arrived in Port de Boucherville and anchored. All hands were immediately put to work getting off the stores and taking down the house, the whole work being completed and the ship at sea again at 6 p m. the same evening.

We found Mr. McKenzie and his two assistants, Messrs. Gooley and Fleming, in excellent health; they had an ample supply of provisions to have lasted through another winter, and for fuel had thirty-five sacks of coal, besides some two cords of wood. Mr. McKenzie, in his letter, says in regard to the temperature maintained in his station-house:—"A temperature of between 50° and 60° could be kept up when the temperature outside was 45° below zero (our coldest), with quite a light fire."

At the time of our arrival Mr. McKenzie and his assistants were engaged in collecting and drying turf for fuel in anticipation of spending a second winter there. This turf dried, and burned with a little seal oil or fat of any kind, makes an excellent fire.

Mr. McKenzie and his party had been very successful hunters, and during their entire stay on the island they had rarely been out of fresh meat—deer, ptarmigan, ducks and geese, having been shot in considerable numbers.

About Nottingham Island there was a good deal of loose ice, which, though nothing to seriously affect navigation, was heavy old ice, and was undoubtedly the advance guard of the pack of old ice coming down from the north, but appearing somewhat earlier than in 1885.

September 9th. After leaving Nottingham Island the wind again began to freshen from the eastward, with a rapidly falling barometer; it blew fresh all day of the 9th, and before midnight it was blowing a whole gale. This continued all day of the 10th and up to the evening of the 11th, the weather being thick with occasional snow showers. At 10 p.m. of the 11th the wind died down very suddenly, and at 9 a.m. of Sunday, the 12th, we arrived in Ashe Inlet.

At this place I had a large beacon erected on the top of a high bluff close to the shore. This we named Tyrrell's Bluff and Beacon. It is an excellent mark, as both from east and west the hill top shows against the sky line, and the beacon stands out in bold relief.

September 13th. All hands employed in getting off the stores, unused provisions, &c.

14th, 15th. Dense fog in the Straits, and as our next port was Stupart's Bay, on the south side, it was useless to go out till there was a reasonable certainty of having clear weather to make the land over there.

September 16th. This morning the weather being clear left Ashe Inlet at 5 a.m. and steamed across the Straits, arrived and anchored in Stupart's Bay at 3 p.m.

We found Mr. Payne and his two assistants, Messrs. Paul and Boutellier, in excellent health. They had experienced no serious difficulty in dealing with the Eskimo, and had scarcely touched their salt provisions, so plentiful had seals and game of various kinds been with them. Shortly before the arrival of the "Alert" Mr. Payne had himself shot some seventy geese in one day.

Besides carrying on the regular series of meteorological and tidal observations, as well as those required to be made in regard to the movements of the sea. Mr. Payne has made very careful observations of the flora and fauna. He has complete collections of plants with dates of budding, leafing, flowering, seeding, and withering, he has also carefully preserved specimens of marine fauna in alcohol. Mr. Payne reported that salmon and trout had been very plentiful and he sent on board for our use a barrel of salted salmon, which, with the geese he had shot, made a very pleasant and wholesome change of diet for us.

17th, 18th, 19th. The wind blowing a fresh gale throughout, causing such a heavy surf that it was impossible to get off any of the stores.

September 20th. Sent Mr. Tyrrell down in one of the whale boats to make a track survey of the lower part of the Sound.

September 21st. Mr. Payne having reported to me that he had seen at a spot some ten miles distant four small cast iron cannon and a large mooring anchor, I sent Capt. Barrie down with a boat's crew to examine and if possible to bring away the guns.

Capt. Barrie reported that there was a large stone beacon on one of the hills close by, and that the guns and anchor were up above high water mark and had no appearance of having been cast up by a wreck. There were no signs of any building and the small gun, which Capt. Barrie brought back must have been of great age as the year marks are completely eaten away by rust and the iron deeply pitted and this although the guns were lying well up clear of any possible contact with the sea water.

Mr. Tyrrell reported that some of the small islands in this Bay were full of magnetite; at one place on a high bluff in rear of where the guns were found, the compass was utterly useless.

Towards the evening of this day (21st) the weather again became thick and rain commenced with increasing winds.

September 22nd. I had intended going to sea this morning at daylight, but before then it was blowing a strong gale, accompanied by snow at intervals, and continued to do so up to 10 p.m. of the 24th.

During our stay here I had secured fairly good observations for position. These place the observing station, which is 300 feet north (mag.) from the weed-covered landing place at high water, about the centre of the sandy beach, in

Latitude, approximate, 61° 34′ 48″ N.
Longitude do 71° 31′ 30″ W.

On the morning of the 25th, left Stupart's Bay for Port Burwell, and made a running survey of the coast from Neptune Head to Long Island.

This gives approximately the true position, in latitude and longitude, of the coast line, but owing to the distance which the ship was from the shore it was impossible to work in any details. The coast line east of Prince of Wales Sound is laid down on the Admiralty Charts much further north than it really is.

After leaving Long Island I steered for a point some little distance to the north of the position of Green Island, as laid down by Captain Parry. On the following morning at daylight I was abreast of the position, and but little to the north of it.

The morning was clear and bright, and no sign of land was to be seen from the mast-head.

I got good sights for position at 9 a.m. and noon, and consequently cannot have been much out of the position laid down. I am therefore forced to conclude that Green Island, as laid down by Parry, has no existence, especially as he marks it (high). Moreover, I did not see it on the passage in, though the ship passed within ten miles of it. on a fine clear morning. I have therefore taken it off the chart.

Sunday, 26th. Arrived and anchored in Port Burwell, at 4 p.m. We here found Mr. Shaw suffering from a severe attack of scurvy. He was very low, fainting at once if he sat up for more than three or four minutes, and this fainting occurred with such frequency that I greatly feared for his life.

Soon after he came on board a marked improvement was visible in his condition, and by the time we arrived in Halifax he had nearly recovered.

It is needless to say that for some time prior to the arrival of the ship Mr. Shaw had been completely incapacitated for duty, but I am happy to be able to state that the observations were very satisfactorily taken by his assistants, Telesphore and Jean Mercier.

September 27th. Employed in taking down the house and receiving on board all the unexpended stores and provisions.

The Messrs. Mercier had killed and dried some codfish, which though small were very fine and were well "made." They reported that the codfish had struck in in considerable numbers, and that if they had been able to afford the time they could have captured many more.

Mr. Shaw reported to me an incident of Eskimo administration of justice, which was, to put it mildly, somewhat summary in its procedure.

There lived between the Cape and Aulalsivick, a good Eskimo hunter, whose native name is not given, but who was christened by our station men "Old Wicked." He was a passionate man and was continually threatening to do some bodily harm to the other more peaceably inclined natives. Finding himself so successful with the natives, he, after persuading one or two others to accompany him, came to the station and demanded food and the big station boat, but was somewhat surprised to be seized by the neck and kicked out of the house. He then altered his tactics and became very subservient to our people, but his arrogance and petty annoyances to the other natives became at length unbearable. It appears that these unfortunates held a meeting and decided that "Old Wicked" was a public nuisance which must be abated, and they therefore decreed that he should be shot, and shot he was accordingly one afternoon when he was busily engaged in repairing the ravages which a storm had made in his "igloo" or snow house. The executioner shot him in the back, killing him instantly. The murderer or executioner (one hardly knows to which title he is the more justly entitled) then takes both of "Old Wicked's" wives and all his children and agrees to keep them. The last act in this drama is when the now muchly married executioner reports the whole case to the Hudson's Bay officer at Nachvak, merely mentioning that he will keep the women and children so that they shall be no burden on the company.

September 28th. Blowing a fresh easterly gale. All stores and lumber are now on board and we only wait for the weather to clear up before going to sea.

September 29th. Left Port Burwell at 9.30 a.m. and passing through Gray Strait made running survey of the Button's Islands and the Cape Chudleigh coast, taking soundings regularly every half hour, and although on the passage to Nachvak Bay we were at one time more than 30 miles off the coast, at no time did the water deepen to as much as 100 fathoms.

This showed that the bank which we discovered here on 8th July extends off Eclipse Harbour to nearly 30 miles off shore. A bank situated as this one is, on the south side of a deep water channel, is of the greatest value to ships making the Straits in thick weather. The bank can be made and then steering north, true, a sufficient distance to clear the Button's Islands steam in fearlessly about the parallel of 61° N.

Considering the importance of this discovery, I should have liked to have been able to outline the bank, but fears for Mr. Shaw's health compelled me to push for home, where he would have the advantage of proper medical advice and attendance.

September 30th. Arrived in Nachvak and went up the Inlet to the Hudson's Bay Company's post. I arranged with Mr. Ford. the agent of the company, for the sale of the station house left here; having completed these arrangements, we left the post shortly after noon and anchored in Skynner's Cove for the night.

I did not at first shape course directly down the coast, but steered east until we reached a depth of 100 fathoms, at which time we were more than 70 miles off the land.

The remainder of the voyage was uneventful, we had a fine run down the Labrador coast and got into the Straits of Belle Isle early in the morning of 5th Oct.

When off Forteau Point on this afternoon, the wind, which was blowing from S.W., had now increased to a gale, against which we made little or no headway. I therefore ran into Forteau Bay for shelter, anchoring there about 6 p.m. The gale continued all the next day, but at 5 p.m. it shifted to N.W., when I at once put to sea, and passing Bay of Islands about noon on the 7th, reached Meat Cove and made our number on the 8th, then passing down the west side of Cape Breton Island and through the Gut of Canso, arrived in Halifax and made fast to the Departmental Wharf at 4 p.m. of Sunday, the 10th October.

All hands were at once discharged, and only such men re-engaged, at port wages, as were necessary for the performance of the work in hand.

ICE OBSERVATIONS.

ICE MET WITH ON THE VOYAGE OF THE "ALERT," 1886.

The first field ice made this year was on the 2nd of July, about 60 miles south of Cape Mugford. It was heavy, but much scattered, and from this point to Cape Chidley the ice lined the coast, being tight for about 15 miles off shore, and beyond that, slack, for about 10 miles more. After getting round the Buttons, dense fog set in, and the ship was beset, finally drifting about 30 miles to the south before the weather cleared on the 8th; the ship was only beset at times, the ice running abroad frequently, so that progress could have been made had the weather been clear.

This ice was heavy, old ice, much broken up, the largest piece to which the ship was made fast was about 300 yards by 200 yards; at the time this was measured the fog was so dense that the men engaged in the work were out of sight from the ship, and we had to keep the whistle blowing to guide them back.

On the 9th, we found that the pack of ice which extended to the east of Cape Chidley shore about 18 miles, ran 14 miles north of the Buttons, and all this day and the 10th heavy ice lay to the south of the ship.

On July 11th found that the ice trended to the north, following the lay of the coast, leaving only a narrow lead of open water along under the shore from Ashe Inlet westward. From this station to the western end of the Straits, the ice was one continuous pack, with little water holes here and there showing up as we worked through. At the western end of the Straits the ice was heavier and in larger sheets than that off Ashe Inlet, some of the floe pieces were upwards of a mile in length and formed of hummocky old ice, now worn a dirty brown colour. Many of the smaller pans assume a crater-like shape, a pool of water forming in the centre, and gradually rotting through in this way.

To those who have never experienced it, the uncertainty of ice navigation is something almost incredible. At one time the ship may be fast, and the ice all tight run together; so that, even from the mast-head, no water at all can be seen, and you are firmly convinced that the ship will stay where she is till the ice melts: some change of tide or wind occurs; and in less than half an hour, the ship is steaming full speed, only hitting once in a while as she twists about in the spreading pack, and

per contra sometimes, when all things look well, the pack closes, and there is nothing to be done but wait patiently till it shall, as suddenly, open again.

From the 11th to the 19th July the ice covered the Straits from "Emma Island" to Cape Digges, and through this 200 miles we worked, every time the ice opened gaining something, if only half a mile. Much of this ice was heavy old ice, and of such a nature that no ordinary steamer which could be used as a freight-carrier, even if strengthened and sheathed for ice, could, in my opinion, have passed through at this time without injury.

On leaving harbour of Digges Island on the morning of the 25th the ship was again beset and only got clear on the following morning. After this date we met no ice which would in any way have interfered with navigation.

Captain Guy, of the steamer "Arctic," one of the most powerful of the Dundee whaling fleet, has kindly furnished me with notes, from his experience in Hudson's Straits this year, and the following is taken from his communication:—

"The 'Arctic' left St. John's, Nfld., on 16th May, and proceeded northwards, making the ice at the south side of Cumberland Gulf on 25th May, intending to go into the gulf; the ship was, however, beset about ten miles from Monumental Island, wind being from the eastward, and drove from there round the south side of Resolution Island into Hudson's Straits, still fast in the ice, and only got free at the Lower Savage Islands on 2nd June."

Capt. Guy found the S.W. ice extending to the east of Resolution Island and Cape Chidley, about 40 to 50 miles tight, with from 10 to 20 miles of slack beyond that.

From the Lower Savage Islands to Ashe Inlet, Capt. Guy says, they had no trouble, but the voyage occupied from 2nd to 5th June, and the distance is only 150 miles; we must admit that the progress of the "Arctic" was not very rapid.

After leaving Ashe Inlet, Capt Guy states that he found the ice much heavier, being now from 15 to 20 feet thick; proceeding north-westward, he got up into Fox Channel as far as Cape Queen; here, however, he found an impassable barrier of ice, and tried to cross the channel to the westward; this was also impossible, and so the "Arctic" headed south, watching for a slack place to enter the barrier of ice. From the 20th June to the 25th July, the "Arctic" was steaming between Cape Queen and Charles Island, trying to get into Hudson's Straits, and only reached the western end of the Straits on 26th July, or five days after the "Alert" had got through and into harbour at Port Laperrière.

Capt. Guy ascribes the fixed condition of the ice to the fact that there was no southerly wind during the whole time he was trying to get through, but our records at Port Laperrière show that winds between S.E. and S.W. prevailed on twenty-one days out of the thirty-five; the winds were, however, light, and the breadth of the pack so considerable, that winds, unless long continued, would have but little effect, besides which, Capt. Guy was trying to work through too far to the north. Capt. Guy, on his voyage home in October, tried to pass up through Fisher Strait, but found it full of heavy old ice, into which he would not put his ship, but, though he was half way through the Strait, turned and, passing south of both Southampton and Mansfield Island, met loose ice again off Cape Digges, after which, with the exception of the East Greenland pack, which was sighted off Cape Farewell, no more ice was seen on the voyage.

STATION No. 1.

PORT BURWELL.

ICE OBSERVATIONS.

October, 1885.

No field ice reported here in this month.

November, 1885.

20th. First field ice seen.

21st, 22nd. Light field ice as far out as can be seen from Beacon Hill.
23rd, 24th, 25th. Ice extends as far as can be seen.
30th. Solid field of ice extends to the horizon.

December, 1885.

No report made on the ice in this month.

January, 1886.

No report on ice.

February, 1886.

26th. From the Beacon Hill saw open water about two miles from the shore, extending from N. to S.W.; atmosphere hazy; could not see how far the open water extended.
27th. Harbour ice 3 feet 7½ inches thick.

March, 1886.

2nd. Clear water extends from S. to S.W.; in a north-west direction loose field ice as far as can be seen with the telescope.
4th. Clear water to S.W.; field ice from N.W. to N. as far as can be seen.
7th. No open water visible.

April, 1886.

1st. Harbour ice now 3 feet 9 inches thick; has increased only 1½ inches in the last month.
3rd. Open water for about 3 miles from shore; field ice beyond.
5th. An iceberg visible about 5 miles off, bearing W.S.W. (true); it is moving out of the Straits.
20th. A little open water to the S.W. some distance off shore.
25th. A sheet of clear water near the shore; ice beyond extends from S.W. to N.W.; in the N.W. a little open water shows.
26th. A little field ice visible about west; elsewhere clear water to the horizon.
27th. Open water near shore; field ice beyond.
28th. Loose field ice in S.W. and west; ice is closely packed north of this bearing.
30th. Ice tightly packed, but much broken.

May, 1886.

1st. Ice in the harbour is 3 feet 10½ inches thick.
16th. Open water shows to S.W., and a little also shows here and there, from W. to N.
23rd. A large sheet of water shows to the south.
24th. Open water close to shore; weather hazy; could not see out far.
25th. Open water to the S.W. as far as the horizon; air very clear; can also see a large sheet of open water from S.W. to N.W.; ice beyond.
26th. Open water close to the shore; ice from S.W. to N.W.
29th. Open water same direction as yesterday; ice beyond seems much broken up.
30th. Ice tightly packed as far out as we can see; a small lake of open water in S.W. near the shore.
31st. Small lakes of open water show through the pack in every direction.

June, 1886.

2nd. Lanes of open water in S.W. close to the shore; field ice beyond seems loose.
3rd. Ice same as yesterday.
5th. Large sheet of open water in S.W.
6th. Ice tightly packed.
7th. Ice tightly packed but much broken; small streaks of open water.

8th. Streaks of open water to the south, and in the S.W. field ice is closely packed as far as be seen.

9th. Field ice to S.W.

10th. Open water extends out for two miles.

11th. Same as yesterday.

13th. Open water in every direction; a little loose ice showing in the offing.

14th. Foggy; no ice visible.

16th. Open water in every direction; a little loose ice in the offing.

20th. Ice tight along the shore and extends to the horizon. Water sky to the N.W.

21st. Heavy close ice in every direction.

22nd, 23rd, 24th, 25th, 26th, 27th. Same as 21st.

28th, 29th. Foggy, open water shows near the shore.

30th. Ice very much broken up, with open water showing in considerable quantities.

July, 1886.

1st. Ice continues about the same.

2nd. Ice loose close to the shore, but seems tighter further out.

3rd. Ice loose to southward, but now closely packed in N.W. Lakes of open water show everywhere.

4th. Ice same as yesterday.

5th. Foggy.

6th. Fog hanging off outside.

7th. Snowing nearly all day.

8th, 9th, 10th, 11th. Open water close to shore. Field ice beyond, most closely packed from W. to N. but lanes of open water show in places.

12th, 13th. Open water in S.W., but from west northwards closely packed field ice. Eighteen icebergs are in sight to-day.

14th. Harbour ice is breaking up to-day, outside the ice is looser.

15th, 16th, 17th. Open water near shore; field ice in the offing.

18th. A little open water shows to south; elsewhere field ice, which looks very solid though having some water holes in it.

19th. The harbour ice having gone, the harbour is now full of heavy field ice.

20th. A little ice near shore, but pretty clear as far as we can see through the haze.

21st. Clear water in the south, but from S.W. to north heavy field ice; harbour is still full of ice.

22nd. No ice visible.

23rd. Some field ice some distance off to N.W.

24th, 25th. Open water in south; field ice from west to north.

26th, 27th, 28th, 29th. A good deal of ice shows in different directions, but it is loose, and the area of clear water showing is very considerable.

30th, 31st. No ice in sight. Heavy sea outside.

August, 1886.

1st. No ice in sight.

2nd. Some scattered field ice shows to the northward.

3rd. No ice in sight.

4th. A little ice shows to the westward.

5th, 6th, 7th, 8th. A little ice shows to N. W.; clear water in every other direction.

9th. Foggy.

10th. Fog continues, but loose field ice is near the shore.

11th. Small scattered ice extends from S. W. to N. W.

12th. Clear water to the south; from S. W. to N. loose field ice, but open water shows beyond the ice in many places.

13th, 14th. Field ice from S. W. to N. W, a long distance off shore; clear water in all other directions.

15th, 16th, 17th, 18th, 19th. No ice in sight.

20th. A little ice close to the shore, and some came into the harbour to-day.

21st. No ice in sight, nor was any seen after this date, up to the time the station was relieved.

STATION No. 3.

ASHE INLET.

ICE RECORD.

September, 1885.

20th. No field ice in sight. Ice on ponds one inch thick. Eleven icebergs in sight. No field ice seen during the month, but numerous icebergs passing westward.

October, 1885.

26th. First field ice observed from Lookout Hill, lying on the horizon to the westward. Ice forming in the harbour and on the rocks along the shore.

27th. No ice visible, but a white line shows along the western horizon.

28th, 29th, 30th, 31st. No field ice visible, but a number of icebergs seem to have taken the ground on the shoals.

November, 1885.

1st. No ice in sight except the bergs.

3rd. The Inlet is nearly covered with newly formed ice about three-quarters of an inch thick.

th. Ice two inches thick in the harbour.

8th. Field ice is visible to the southward, but clear water between the shore and pack, at least twelve miles.

9th. Foggy.

13th. No trace of field ice.

15th. Large field of young ice extending from north to west, and 5 to 10 miles off shore.

16th, 17th, 18th, 19th, 20th. Straits nearly covered with young ice.

21st. Most of the ice has been driven off the shore by the wind.

22nd. Young ice still about. Harbour frozen over.

23rd. Harbour ice broke up and passed out of the Inlet.

29th. Straits frozen as far as visible, some three miles. Dense fog beyond, probably over open water.

30th. Snowing and drifting, cannot see out into the Straits.

December, 1885.

1st. Ice is five or six inches thick on the Inlet; snow obscures the view of the Straits.

2nd, 3rd, 4th, 5th. Snowing and drifting; Straits completely hidden.

6th. Straits frozen solid for eight or ten miles; beyond that loose ice shows.

7th, 8th. Straits obscured by snow drifting.

9th. Ice covering straits as far as visible.

10th, 11th, 12th, 13th. Straits frozen over as far as visible from look out.

14th. Examined the straits from summit of "Tyrell's bluff." 450 feet above M.S.L. Ice covers the Straits in every direction, but is somewhat broken.

22nd. Ice visible in every direction, but much broken.
23rd. Snowing; Straits obscured.
24th to 31st. Straits generally obscured, but when opportunity offered and observation made, no change was apparent.

January, 1886.

1st to 20th. No change observed in the condition of the ice.
21st. Ice much broken and running.
22nd, 23rd, 24th. Straits obscured.
25th. Eskimo state, that the White Straits, to the north of this island are frozen over solid, and the ice is stationary.
26th, 27th, 28th, 29th, 30th, 31st. No change observable in the condition of he ice in the Straits.

February, 1886.

1st, 2nd, 3rd. Weather thick, no change in the ice so far as can be seen.
4th. Ice much broken.
5th, 6th. Ice much broken and masses of vapour rise from the water.
7th to 15th. No change in the ice.
16th. Ice is still much broken, but now very compact.
17th to 28th. Straits much obscured; no change in the ice reported.

March, 1886.

1st. Open water as far as visible to south-east; to the south and west the ice is only two or three miles from shore.
6th. Ice very loose and running; water horizon in S.E. and S.
7th, 8th. Foggy.
9th. Ice still loose and moving freely with the tide.
10th. Much open water shows amongst the ice.
12th, 13th, 14th, 15th. Misty over Straits; snow drifting.
18th; 19th, 20th. Ice much broken up and swinging with the tide.
21st. Water appears to be on the horizon, to the S.W.
23rd. Foggy.
24th. Ice loose, moving with the tide.
25th, 26th. Snow drifting all day.
27th. Ice loose, much open water shows.
28th. The heavy ice has been driven off shore several miles.
29th. Ice still off shore. New ice forming on the open water.
30th, 31st. Snow drifting, Straits cannot be seen.

April, 1886.

1st, 2nd. Ice tight in every direction.
3rd. Ice loosened a little to-day.
4th. Open water shows.
5th, 6th. Ice loose and open.
7th, 8th. Ice loose, swinging with the tide.
9th, 10th, 11th. Snowing and drifting; Straits obscured.
12th. Ice closed up tight this afternoon, opening again in the evening.
13th. Ice tight.
14th. Ice loose off shore.
15th, 16th. Snowing and drifting.
18th, 19th. A considerable extent of open water off shore.
20th. Ice has come in shore again, tight.
21st, 22nd, 23rd. Ice slack.

24th, 25th, 26th. Open water extends several miles off shore; ice is barely visible from the station.
27th. Ice driven in tight on the shore.
2 th. Ice slack.
29th, 30th. Open water extends for miles off shore.

May, 1886.

1st. Ice well off the shore.
2nd. Ice in shore again, but long leads of open water show in places.
3rd. Ice close in shore and tight to the westward, clear water as far as can be seen to the eastward.
5th. Ice slack, but near the shore.
6th. Snow drifting, Straits obscured.
7th. Open water extends for several miles.
8th, 9th, 10th, 11th, 12th, 13th. Ice tight and close in on the shore.
14th. Snow drifting, cannot see the Straits.
16th. Ice tight, no water visible in any direction.
17th, 18th. Mist and snow obstruct our view of the Straits.
19th. Ice slack.
20th. Ice tight in the morning, slackening again at night.
21st, 22nd, 23rd. Ice tight in every direction.
24th. Snowing; ice slackened off in the evening.
25th, 26th, 27th, 28th. Ice tight; no water visible.
29th, 30th. Mist and rain obscure the view of the Straits.
31st. Ice the same as formerly as far as can be seen.

June, 1886.

1st, 2nd. Weather misty. No change in the ice as far as can be seen.
3rd. Ice close on the shore, not moving perceptibly.
4th, 5th. Open water along shore. At 3 p.m. of the 5th the ice was several miles off, and on the 6th steamship "Arctic," Captain Guy, made fast at the entrance of the harbour, the harbour ice being still solid.
7th. Foggy. "Arctic" left at 8 a.m. Ice again in on the shore, but quite slack.
8th, 9th, 10th, 11th. Ice slack and swinging off and on the shore. Plenty of open water showing.
12th, 13th, 14th. No ice visible to the eastward.
15th. Foggy.
16th. Plenty of open water showing.
17th. Ice close in on shore, slacking off again at night.
18th. Misty, view of Straits obscured.
19th, 20th. No ice to the eastward, but to south and west the pack is from five to ten miles off shore.
21st, 22nd. Still open water to the eastward.
23rd. Very little ice visible.
24th. No change in the appearance of the ice in the Straits. In the harbour the ice has melted away a great deal, and is quite through in some places.
25th. A little scattered ice in the east. Ice in harbour rapidly breaking up.
26th. Dense fog.
27th, 28th, 29th. No ice to the eastward. The body of the pack lies about eight miles off shore, to the S.W., gradually receding.
30th. Harbour ice generally breaking up.

July, 1886.

1st. Foggy.
2nd. Ice from eight to ten miles off shore to the S.W. About three-fourths of the harbour ice is broken up.

3rd. Harbour ice completely broken up. Ice closing in on the shore.
4th. Harbour filled with heavy pack ice. The whole body of the ice is tight in on the shore.
5th, 6th. Dense fog.
8th. Open water and slack ice to the east. To the west the ice is close in.
9th. Plenty of open water, with scattered ice only showing.
10th. Scattered ice about.
11th. "Alert" arrived at 4.50 a.m., sailed again at 6 a.m. The ice apparently about eight miles off shore.
12th. Plenty of water along the shore. The body of the ice a little closer than yesterday.
13th. Foggy to the westward. No ice showing to the eastward.
14th. Foggy.
15th. Still foggy, but the ice has come in on the shore again.
16th. A little scattered ice along the shore, is all that is in sight.
19th. Some loose ice coming into the harbour, none visible outside.
20th. Ice shows to the west in the forenoon; a heavy swell set in from the south in the afternoon; fog shut down thick.
21st. Ice again closing in rapidly on the shore. No water to be seen in any direction.
22nd. Ice still tight.
23rd. Ice slack outside.
24th. Fog very dense.
25th. Ice close as far as the Straits are visible.
26th, 27th, 28th. Dense fog.
29th. Ice looser and moving, but no water showing.
30th, 31st. Ice loose again.

August, 1886.

1st, 2nd. Ice tight, till 11 p.m of the 2nd, when water begins to make along the shore.
4th. Ice loose and running.
5th. Plenty of open water shows.
6th. Loose ice outside.
9th, 10th, 11th, 12th. Dense fog over the Straits.
13th. A very little loose ice shows.
14th. A heavy swell heaving into the harbour.
16th. No field ice in sight; eight icebergs can be seen from the look-out.
17th, 18th. Foggy. No field ice seen after this date.

STUPART'S BAY.

ICE RECORD.

From 22nd August to 28th September there was no ice seen.
September 28th. Ice is forming at mouths of small streams, and after breaking up carries with it far to sea quantities of seaweed, shells and gravels which adhere to it.

October.

17th. No change has taken place since 28th September. Large masses of hard packed drifted snow on the shores are continually being carried off by receding tides.
18th to 23rd. Ice continues to break off the shores and drift away, carrying seaweed and small stones
23rd. A small iceberg was seen to-day.

26th. During last night a thin film of ice formed on the Bay. A ridge of snow and ice 2 feet high has formed along the shore, over which the increasing tides rise. A long line of field ice can be seen lying between north and south near the horizon.

27th. Field ice seen yesterday appears to be approaching in spite of a contrary wind. Ice again formed over the Bay, and is breaking up and piling, forming quite thick ridges.

29th. All ice in the bay has broken into small pieces, which at low tide rest upon the boulders, to which much of it adheres, the tide rising over it. Field ice appears stationary.

30th. The wind blowing freshly from the north-west during the night; all the ice that was in this and neighbouring bays, has drifted to sea.

November, 1886.

1st. The field ice now extends all along the horizon, and appears to be about 10 miles from shore to the north-eastward.

3rd. To-day a portion of the field ice moved directly southward, and is gradually closing in. The Bay is open.

4th. As fast as ice forms in the bays it drifts to sea, and now covers the water between the land and the field ice which is quickly approaching.

6th. The field ice, though loose, is now close upon the land, and has filled most of the larger bays, driving and piling the thin native ice in front of it.

7th. At the time of high tide large masses of ice over which the water rises occasionally come to the surface carrying immense stones with them. These pieces of ice with their freight of stones often rest upon the ice still adhering to the bottom as the tide falls. Field ice is more open.

10th. The prevailing south-westerly wind has driven the ice out of all bays excepting the smaller ones, and large patches of open water can be seen throughout the field ice.

11th. Fog and mist covered the Straits to-day.

12th. All the ice in the bay facing the station drifted to sea and now large stretches of water can be seen in every direction.

13th. At 8 a.m. there was a great deal of open water to be seen; towards afternoon, however, an unbroken mass of field ice could be seen quickly appoaching from the northward.

14th. The Strait is now packed with heavy field ice throughout, the smaller bays only being open.

15th, 16th. Field ice is more open and long narrow leads of water can be seen.

18th. As far as can be seen the ice is very loose. A large berg can be seen to the E.S.E.

19th. All the ice has drifted out of the bays excepting isolated pieces, many of which measure 16 feet in thickness.

20th. During the night all open water between the ice floes was frozen and now only ice can be seen.

21st, 22nd. Ice in the bays is firmer. Long lanes of open water can be seen throughout the pack.

23rd. To the north east the field ice appears to be tighly packed, whilst from that point along the shore to the south-east it has moved several miles from land.

25th. Ice is tightly packed to the north eastward and much more to the south-eastward. Several bergs are seen to the eastward.

26th. All bays are again open, and the prevailing strong north-westerly wind has driven all ice, some miles from the shore.

30th. No perceptible change has taken place during the past few days, there being a wide belt of open water round the land; now, however the ice appears to be closing in again.

December, 1885.

1st, 2nd, 3rd. Owing to snow falling and foggy weather no observation of the strait clould be made.

4th. The ice is very open throughout.

6th. During the night the ice in the bay, which was 10 inches in thickness, again broke up and by the afternoon the bay was again free of ice, there also being a wide belt of open water, round the coast.

7th. Again the ice has returned and now this and neighbouring bays are filled with heavy ice, some of which is 15 feet in thickness.

8th. The Strait and bays are now tightly packed with ice, there only being some small pieces of open water here and there.

9th. Fog completely hides the Strait.

11th. There is a wide belt of water round the shore, and the ice appears more open throughout.

12th to 17th. Little change has taken place. No open water can now be seen.

18th. A decided movement has taken place in the ice to-day, the prevailing south-westerly wind driving it off the shore, while to the eastward and south-eastward large stretches of open water can be seen.

21st. During the past few days mist has hung over the Strait, so that it has been impossible to see far beyond the shore. The ice, though opening occasionally, is compact throughout.

22nd. A good view of the Strait was obtained to-day; ice is compact throughout.

24th. Small pieces of open water can be seen throughout the pack, especially so near the horizon, where leads, some miles in extent, can be seen.

28th. Open water seen during the past few days is now frozen.

29th, 30th. Misty weather has prevented any observation of the Strait being made.

January, 1886.

2nd. During the morning the ice was still compact, but in the afternoon a number of small pieces of water could be seen throughout the pack.

4th. There is now a wide belt of open water round the shore, beyond this it is too misty to see.

9th. Owing to foggy weather, it has been impossible to see beyond the shore during the past few days. To-day large stretches of open water can be seen, and to the east and south-east all the ice has moved some distance from the shore.

12th. Until this afternoon, owing to dense mist hanging over the Strait, it has been impossible to see any distance beyond the shore. A large area of open water could be seen to the south-east.

13th and 14th. A few small pieces of open water can be seen.

15th. Open water from north to east-north-east as far as can be seen, also large stretches of water in east-south-east.

19th. Since the 15th inst., vapour rising from water near the shore has completely hidden the Strait. To-day the ice is comparatively compact throughout.

20th. Snow falling; cannot see beyond the shore.

22nd. The horizon is misty. The ice is very much broken throughout the pack, and is all moving to the eastward.

28th. It has been impossible to see beyond the shore since 22nd instant owing to fog. Where rough ice was a few days ago, is now smooth new ice, showing the former must have broken up and drifted out.

29th. Small pieces of water may be seen throughout the pack, and all ice is moving north-eastward.

30th, 31st. Misty; no observation of the Strait.

February, 1886.

1st. A good view of the Strait was obtained to-day. A few small patches of water can be seen to the north-east.

2nd, 3rd. Misty; cannot see beyond the shore.

4th. There are still a few patches of water to be seen to the eastward.

5th. There is a large lake of water in the south-east, and some smaller ones to the eastward. All ice is moving eastward.

9th. No change has taken place during the past few days. The ice is now compact throughout.

10th. At 2 p.m. some large pieces of water were to be seen to the south-eastward, and all the ice was moving slowly eastward.

11th. The ice continued to open and close at short intervals of time during the day.

12th. At 2 p.m. there was open water along the shore from N.E. to E., and all ice was moving slowly eastward.

16th. Since 12th instant it has been impossible to see the Strait owing to misty weather and snow falling. To-day the weather being clearer, it was found all the ice had drifted about ten miles from the shore, and now new ice is forming on the comparatively calm water.

17th. All open water seen yesterday is now frozen, and in places is breaking up and piling as it drifts to the eastward.

18th. All the newly formed ice within a few miles of the above is much broken, and a great deal of water can be seen.

21st. A bank of fog has continued to hang over the Strait for several days, and it has been impossible to see far from the shore. There is now a wide belt of water all round the shore.

22nd. Fog continues. Can see about ten miles from shore. Large stretches of open water can be seen in all directions.

23rd to 28th. Misty weather has continued so that it has been impossible to see further than a few miles from the shore. The ice continues much broken, and there are large pieces of water to be seen.

March, 1886.

2nd. The ice is compact throughout, and there was no perceptible movement in it at 2 p.m.

3rd. Can only see about three miles from the shore. The ice appears to be breaking up to the eastward.

4th. The ice is generally compact, excepting near the shore, where there is some water.

5th. The horizon is clear, at 2 p.m. all ice was loose and much broken, and there is a belt of water all round the shore.

8th. Since the 5th instant it has been impossible to see far from shore owing to fog. To-day the ice is compact throughout, excepting near the shore, where there is a little open water. At 2 p.m. is moving eastward.

9th. Ice is compact, and at 2 p.m. it was all moving eastward.

11th. Ice continues in the same condition.

13th. Ice is much broken and more open water can be seen than usual. At 2 p.m. all ice was moving northward.

14th. Extensive patches of water can be seen in all directions.

15th to 18th. Ice in same condition as on the 14th instant.

18th. Only a very few spots of open water can now be seen.

19th, 10 a.m. A great deal of open water can be seen from north to east. All ice appears loose, and is moving east.

20th. Owing to fog, can only see about ten miles from the shore. Ice is compact to the northward while to the eastward there is open water as far as can be seen.

21st. The ice to the eastward has again closed in but is loose, excepting to the northward where it remains compact.

23rd. Ice remains in about the same condition as on 21st inst.

24th. As far as can be seen there is a great deal of open water, and at 10 a.m. and 2 p.m. all ice was moving westward.

28th. Stormy weather and fog have prevented any observation of the Strait. To-day the ice is compact throughout.

30th. A wide lead extends from N. to N.E., also some water to the south-eastward.

31st. The ice is now much looser in every direction, and leads of open water can be seen throughout the pack.

April, 1886.

1st. No change has taken place in the condition of the ice.

2nd. Snow drifting, cannot see beyond the shore.

3rd. The ice is compact throughout excepting near the shore where there is a little open water.

4th. There is now a great deal of open water near the shore, while some distance beyond the ice is compact.

9th. No perceptible change has taken place since 4th inst.

10th. Only a narrow belt of water can be seen round the shore, and at 2 p.m. all ice was moving eastward.

13th. No change has taken place since 10th inst.

14th. The ice is now compact throughout.

16th. No change during the past two days.

17th. Since yesterday a great change has taken place in the condition of the ice which is very loose and quite navigable, excepting near the horizon where it is rather more compact.

25th. The ice has continued loose and quite navigable since 17th inst., and long leads of water could be seen.

26th. Again the ice has closed and now only a little water can be seen near the shore.

27th. Not much change has taken place since yesterday, the ice remaining generally compact, but occasionally opening here and there, as it is affected by a change of tide.

28th. The ice appears loose near the shore, and compact beyond.

30th. Snow falling and drifting, completely obstructed the view of the Strait.

May, 1886.

1st. The ice is very compact, and shows little sign of breaking up. As far as can be seen it is now an irregular mass of small pans, quite unlike that seen in the earlier part of the winter.

3rd. Not much change has taken place until this afternoon, when all the ice became much looser.

4th to 7th. The ice continues to open and close alternately every a few hours as it is affected by the tides, and the rapid movement along the shore, tends to show there is more room to move than usual.

8th. All the ice continues loose, and all that ice held between the shore and outlying reefs, which has remained firm throughout the winter, is now cracking in many places. Accumulated snow and ice of the winter now forms a cliff, in many places 30 feet in height; large portions of this now occasionally break off and float away as miniature bergs.

9th. The ice is still very loose, and there is a wide belt of water round the shore.

10th. The ice has closed in again; nevertheless there is navigable water round the shore.

11th. The ice is fast closing in upon the land.

13th. No perceptible change has taken place. There is still navigable water several miles wide round the shore, while the ice beyond is compact and stationary.

14th. Cracks in the ice held between reefs and the shore are widening.

17th. During the past few days the ice has become much looser, and now is quite navigable from the shore to the horizon.

18th. With the exception of a long regular line of compact ice near the horizon, there are now only a few loose pans between it and the shore.

19th. The ice appears to be closing in upon the land again.

20th. The inner edge of the pack is now about ten miles off.

22nd. No change appears to have taken place.

23rd, 24th. Foggy; cannot see beyond the shore.

25th. Loose ice now occupies most of the water seen recently, but it is still quite navigable.

26th, 27th. No change.

28th to 31st. The ice has remained very loose throughout, sometimes closing a little, but soon after opening again.

June, 1886.

1st. Only scattered pieces of ice can now be seen between the shore and the horizon, the water being quite navigable for the smallest craft. A large portion of the ice between the reefs and the shore gave way to-day, so that it would now be possible to bring a ship within a mile of the observatory.

2nd and 3rd. Fog covered the Strait all day.

4th. The prevailing strong northerly wind is driving the ice to this side of the Strait, and the inner edge of the pack is now fast approaching.

5th. Once more the ice has closed in upon the shore, and as far as can be seen the pack is unbroken.

6th to 13th. No change has taken place. Not the smallest lead of water has been seen. The ice is now getting very soft, and wherever there is an accumulation of dirt on the ice, such as dust blown off the shore, the ice is melting very fast.

14th, 15th. The ice is rather looser.

16th. Foggy over the Strait.

17th to 21st. The pack, though occasionally opening, is not navigable.

22nd, 23rd. The ice is much looser, and a few small leads of open water can be seen.

24th, 25th, 26th. The ice is compact throughout.

27th. Ice is still compact. Round the edges of the shore the ice is melting very fast, and in a great many of the bays it is breaking up near high water mark.

28th, 29th. The ice remains compact, but the pans are rapidly becoming smaller as they break up with the force of the tides.

30th. The wind shifting to the S.W., the ice became much looser, and now small leads can be seen here and there.

July, 1886.

1st. The ice has again packed very tightly.

2nd. Towards evening the ice became much looser in all directions.

3rd to 7th. The pack has continued comparatively open, but at no time has been navigable.

8th. Ice is again compact. A long line of what appears to be a "water sky" can be seen on the horizon.

9th, 10th. No change in the condition of the ice.

11th. The pack is now open to the eastward, otherwise no change has taken place. There is a long dark line near the horizon that looks much like open water.

12th. The ice is much looser.

13th. The ice is open and almost navigable from the shore to the horizon. All the ice left the harbour to-day, and now all bays are open.

14th. The pack closed in again to-day, filling all the bays with loose ice.

15th. Ice remains compact, excepting to the eastward, where it is more open.

16th to 19th. No change has taken place during the past few days.

20th, 21st, 22nd. Owing to fog hanging over the Strait, it was impossible to see beyond the shore.

23rd. A good view of the Strait was obtained to-day. The pack is now very open and is quite navigable throughout. Eskimo think this is the last of the ice.

24th. Along the shore there is now only some scattered ice, pieces of which came into the bay, and appeared to be quite foreign to the ice formed here. Some pieces measured fifteen feet in thickness, and at their base leaves were found imprisoned in the ice, from which I should suppose these were nothing more than hardened snow that had drifted from the shore.

25th, 26th. No change has taken place.

27th. Fog completely hid the Strait to-day.

28th. Now only small quantities of loose ice can be seen, floating freely to the eastward.

29th to 31st. Dense fog during the past three days.

August, 1886.

1st. Owing to fog, could only see a few miles from shore. There only appeared to be a little loose ice here and there.

2nd. The prevailing strong north-westerly wind is driving what little ice there is in the bays out to sea. A little ice can be seen near the horizon.

3rd. The Strait remains open to the northward and north-eastward, whilst loose ice extends from the shore to the horizon. Blocks of ice, twenty-five feet in thickness, have stranded in this and neighbouring bays.

4th, 5th, 6th. Only very scattered ice can now be seen.

7th. Fewer pieces of ice are to be seen. These shift about with the tides and eventually drift to the eastward.

8th and 9th. Misty weather has quite hidden the Strait.

10th. It now may be said this part of the Strait is free of ice, excepting a few pieces that drift off the shore. These are so few that they might easily be counted.

11th. An unbroken line of ice can be seen along the horizon.

12th. The field ice seen upon the horizon has moved nearer the coast. A bark can be seen nearer the inner edge of the pack, apparently looking for an opening.

13th. Fog has hung over the Strait all day. The bark is in sight.

14th. The ice seen during the past few days proves to be only a belt, both sides of which can now be seen. It is quickly moving to the eastward. The bark was last seen this evening.

15th, 16th, 17th. Only a few scattered pieces of ice can now be seen.

18th. A long line of ice can be seen near the eastern horizon.

19th. The ice seen on the eastern horizon has disappeared.

20th, 21st. Only some very small pieces of ice were seen.

22nd. A small berg seen to the north-eastward.

23rd to 27th. No ice has been seen during the past five days.

28th. A large iceberg seen on the horizon to the north-eastward.

29th, 30th. No ice to be seen.

September, 1886.

1st to 15th. No ice has been seen.

PORT DE BOUCHERVILLE, NOTTINGHAM ISLAND.

ICE RECORD.

September, 1885.

1st to 11th. No ice has been seen.

11th. A large iceberg is moving east; it appeared to come from the direction of Salisbury Island.

18th. SS. "Alert" called, homeward bound.

20th. All fresh water ponds are frozen over.

26th. At 2 p.m. saw field ice for the first time since landing. It extends from south-east northward, and lies some six or eight miles off shore at its southern boundary, approaching nearer the shore to the northward, and seems to be continuous between Salisbury Island and Nottingham.

27th. Ice all round, and has come close to shore to the northward. No open water visible to north-east or east.

28th. Ice formed on the harbour; field ice covering the Straits in every direction, with small spots of open water showing.

29th. Some pieces of the broken floe came into the harbour and grounded at low tide; they are from 15 to 20 feet thick.

30th. The ice has all drifted off to the eastward. At 5 p.m. to-night, no ice in sight except a few scattered pieces and the faint line of white on the horizon.

October, 1886.

1st. The pack has drifted back again, and is to-day nearer the shore to the northward than yesterday.

3rd. The ice is now tight and compact in every direction; from the top of a hill some distance inland, a little open water shows near the horizon between south and east; elsewhere no water to be seen. The bay to the north of the station is frozen so that the seals can lie on it.

4th, 5th, 6th, 7th. Ice in every direction, slackening and tightening with the tide; at times large lakes of open water show.

8th, 9th. Ice still generally covers the whole of the Straits as far as can be seen, but the amount of open water showing is greater than before.

10th, 11th. Not much change in the ice.

12th. Open water to the east and north-east; extends to the horizon.

14th, 15th. Ice lines the shores of the island, and extends out for seven or eight miles; beyond this, open water reaches to the horizon.

17th. Open water can just be seen on the horizon between east and south-east; inshore there are a few small patches of open water; with these exceptions, my whole sea view is covered with pack ice. Harbour all frozen over to-day.

18th. A belt of ice from 5 to 8 inches wide lies along shore. Open water showing beyond.

19th. Open water only shows on the horizon.

20th, 21st, 22nd, 23rd. Ice slack; a good deal of open water showing up.

24th. Foggy.

25th. In the morning the ice had been driven off to the horizon, but by 4 p.m. had returned to within a mile of the shore.

26th, 27th. Ice to east and N. E. is tight, but slack ice and open water show to south and S. W.

28th, 29th. Ice tight in every direction.

30th, 31st. Ice still covers the Strait in every direction, but spots of open water show in some places.

November, 1885.

1st, 2nd. Westerly winds have driven the pack off shore, leaving open water with a few stray pieces of floe floating here and there in it. The body of the ice can just be seen on the horizon.

3rd. Ice has come back to the shore again, but is very slack. Appearance of the Straits is about half ice and half water.

4th. Ice has again tightened up, leaving only a few narrow leads of open water.

5th. Ice is again slack.

6th. At 3.15 p.m., with the exception of a narrow lead of open water close inshore, there is nothing but closely packed ice to be seen to seaward.

7th, 8th, 9th, 10th. Ice opens out and occasionally swings off the shore a few miles and then returning, packs tight on the shore; this goes on with shifting of wind and changes of tide.

11th, 12th, 13th, 14th. Ice has remained close. No open water has been seen.

15th, 16th. No open water.

17th. Water sky to south, but no open water visible.

18th. Snowing and drifting; cannot see any distance.

19th, 20th. Ice still tight. No open water visible. An iceberg which was to the N. E. has been carried south, and now bears south of east.

21st. Ice still tight for three or four miles from shore; slacker beyond. The iceberg seen yesterday has passed out of sight to the eastward.

22nd. Ice loose to the south; elsewhere it is tight.

23rd, 24th. Ice a little looser, generally.

25th. At 9 a.m. the gale has blown all the ice out to sea, to the eastward.

29th. Stormy but open water; as far as can be seen.

27th. Ice has apparently come in again to the south, but mist hangs over the straits.

28th. Again misty.

29th. No ice in sight, except on the horizon to the northward.

30th. Snowing and drifting. View of straits completely shut out.

December, 1885.

1st. Snowing heavily; cannot see beyond the mouth of the harbour.

2nd. Ice has again closed in, and there is no open water to be seen in any direction.

3rd, 4th. No open water in sight.

5th, 6th. Storm and mist; cannot see out into the Straits.

7th, 8th, 9th, 10th. No open water visible.

11th, 12th, 13th. Open water near shore, but dense vapour, which rises, prevents my seeing more than a mile.

14th. Open water on the horizon to the south; there is also a lead of water in shore, running north as far as I can see, becoming wider as it gets farther north, at N. E. it extends clear to the horizon.

15th. The ice has come closer in to the south; to the northward, not much change.

16th. Not much change in the ice.

17th, 18th. Ice remains about the same.

19th, 20th, 21st. Cannot see any great distance owing to vapour rising from the open water.

22nd, 23rd, 24th, 25th. There is evidently much open water in the neighbourhood, though I cannot see any great distance, except at intervals; the ice moves freely with wind and tide.

26th. Weather clear to-day; saw the south coast and the Straits and Salisbury Island for the first time for a number of days. Comparatively clear water in every direction.

27th, 28th. Snowing and drifting; cannot see out into the Straits.

29th, 30th. Snowing and drifting still.

31st. Weather hazy, and cannot see more than 3 or 4 miles. There is open water as far as we can see to N.E., and a small patch near the mouth of the harbour; elsewhere the ice covers the Straits as far as visible.

January, 1886.

1st to 7th. From snow-drift and vapour, have not been able to see any distance.

8th. Open water shows about three miles off the shore and parallel to it. There is no change in the appearance of the ice.

9th. Unable to see any distance from the shore to-day.

10th to 16th. Have never seen clear to the horizon; there is generally some open water in sight, altering its position with the wind and tide.

17th. The only open water in sight, is a few small patches to S.E., although the view is good, Salisbury Island being distinctly visible. Ice is packed very tightly.

18th, 19th. A few small strips of open water show. Vapour bands again obstruct the view of the horizon.

20th to 24th. Unable to see any distance.

25th. Ice moves with the tide, opening and closing the land to the N.E., south of this the ice remains tightly packed.

26th, 27th. Cannot see out into the Straits.

28th, 29th. Ice is looser, but the usual heavy clouds of vapour obstruct the view of the Straits.

30th. View good to-day. To the south, the Straits seem to be tightly filled with field ice, to the horizon. Between N.E. and S.E. the heavy ice lies not less than 5 or 6 miles off shore. Between Nothingham and Salisbury no open water shows.

31st. View again good. Ice seems a little loose to the south, otherwise no change.

February, 1886.

1st, 2nd. Cannot see any distance.

3rd. From high ground inland the Straits are packed tightly with heavy ice, the only exception is to S.E., where a few small lakes of open water show.

4th, 5th. Cannot see any distance.

6th. Can see nearly to horizon. Ice generally tight.

7th, 8th. Large patches of open water show.

9th, 10th. View of Straits interrupted.

12th. There is a strip of water between here and Salisbury Island, elsewhere the ice is solid.

13th. Ice tight everywhere.

14th, 15th, 16th. Heavy gale and snow drift.

17th. Ice has moved out some 4 or 5 miles and swings in again.

18th. Cloudy horizon again.

20th. No open water to be seen.

21st, 22nd. Ice tight everywhere.

23rd. View obstructed.

24th. Large patches of open water south of the harbour some three or four miles from shore, to the north the ice is packed tightly to the horizon.

25th, 26th, 27th. Not much change in the ice.

28th. Large patches of open water to E. and N.E. View is, however, somewhat poor.

March, 1886.

1st, 2nd. Ice packed tightly to horizon. No open water visible.

3rd, 4th. No open water.

5th. A little open water to N.E., but cannot see any great distance owing to vapour hanging over the ice. To the south no open water shows.

6th. A lane of open water runs north and south, some five miles off shore.

7th, 8th, 9th. Ice generally tight, small leads of water only showing occasionally.

10th. This morning about 70 per cent. of the Straits is clear, the ice having run abroad very freely. In the afternoon the ice packed in tightly again on the shore.

11th, 12th, 13th. Cannot see any distance.

14th. No open water in sight.

15th. Snow drifting. View of Straits obscured.

16th. Ice is packed tightly, to the south, and also between here and Salisbury Island, but east of this large lakes of open water show some five or six miles from shore.

17th, 18th. View poor. No open water visible.

19th. View good. No open water in sight.

20th to 26th. Ice moves a little with the tide and small patches of open water show at times.

27th, 28th, 29th, 30th, 31st. Ice tight, no open water to be seen.

April, 1886.

1st, 2nd. No open water in sight.

3rd. Ice slackened off a little to-day.

4th, 5th. Ice tight, no open water.

7th. Ice loosened to-day, long lanes of open water running parallel to the shore, alternate with belts of ice as far as can be seen.

8th, 9th, 10th, 11th. Not much change in the ice.

12th. The ice remained close all day.

13th. No change of any importance, small leads of water show at certain times of tide.

14th. A good deal of open water shows to S.E.

15th, 16th, 17th. Weather stormy, Straits obscured.

20th, 21st. Ice has moved off bodily to the eastward leaving clear water in all directions; south of east the ice between Nottingham and Salisbury remains intact.

22nd, 23rd. Loose ice in every direction swinging with the tide.

24th, 25th, 26th. Ice tight. No open water.

27th. Ice has again slackened, and leads of open water show through it.

28th, 29th, 30th. Not much change in the ice; at times it is tight, and again, occasionally it will slacken off.

May, 1886.

1st. To the south the ice has moved off and clear water extends to the horizon, about S.E. the ice just shows on the horizon, and to the north of this it comes close to shore.

2nd, 3rd, 4th, 5th. Weather stormy, Straits obscured.

6th, 7th. A little open water shows occasionally; on the 7th some of the sea birds put in an appearance for the first time.

8th, 9th, 10th. No change in the ice.

11th, 12th, 13th. No open water, ice tight on the shore.

14th. Ice slackened off a little to day.

15th, 16th. Snow drifting, view of Straits obscured.

17th. No open water, but the ice seems much broken up by the late gale.

19th. A little open water to the south.

20th, 21st. The ice has been blown off the shore and has come back again, but remains loose, with a good deal of open water showing.

22nd, 23rd, 24th, 25th, 26th, 27th. Ice tight, no open water visible.

28th. Foggy all day.

29th. Visibility good, no open water can be seen from the top of the hill to north of station.

30th, 31st. No open water visible.

June, 1886.

1st to 6th. Ice tightly packed the whole time, no open water shows except a small pond or two in the eddy under a point.

7th. Could not see any distance.

8th. Ice slackened off considerably.

9th, 16th. No open water of any extent has been seen.

17th. A good deal of open water shows up to-day.

18th. In the morning the ice is slack, and a good deal of open water shows, but in the afternoon it again came in tight and no open water was to be seen.

19th. No open water.

20th. Ice loosened out to-day again, and moved off the shore some four or five miles to the south; large patches of open water extend to the horizon.

22nd. Harbour ice begins to look shaky, and water appears at head of tide, here.

24th. Ice to the south continues quite slack, about 50 per cent. of open water shows there; to the north of east the ice is still tight.

25th, 26th, 27th, 28th. No change in the ice.

29th. From south round to N.E. the ice has been blown off shore and appears quite loose; north of N.E. it remains tightly packed.

30th. Harbour ice is all broken up, leaving only a narrow strip a few hundred yards wide across at the shoals.

July, 1886.

1st, 2nd. Ice loose as far as can be seen.

3rd. Easterly wind has brought the ice in and it is now a good deal tighter, though open water shows in places.

4th. Foggy.

6th. Open water shows to the south.

8th. Ice apparently remains about the same; compact between here and Salisbury Island, but quite loose to the south, where occasionally the open water extends to the horizon.

9th, 10th, 11th. No open water in sight.

12th. S.W. wind has blown the ice off shore.

13th. Ice to the northward and between here and Salisbury seems compact, but the Straits to the south must be nearly clear as we could hear the sea breaking on the outer edge of the ice near the shore to the south.

14th. View poor.

15th, 16th. Ice tightly packed in on the shore; no open water.

17th. Ice loosened out a little and some open water shows in places.

18th, 22nd. Ice remains loose; much open water.

23rd, 24th. Open water along shore, but ice visible on the horizon.

25th, 26th. Ice swings in a little occasionally, but it is always loose and much broken up.

28th, 8 p.m. Ice packed tightly in all directions.

29th, 30th. Not a particle of open water to be seen. Ice packed tightly to the horizon.

31st. Could not see any distance; the wash of the sea could be heard plainly to the south.

August, 1886.

1st. About fifty per cent of open water, mostly to the south.

2nd, 7th. Comparatively open water nearly all the time.

9th. Ice was running N.E. to-day, at 7 p.m. the only open water visible is a lead close in to the shore and a few spots on the horizon.

10th. Ice slackened off again today.

11th, 16th. Ice quite loose at all times.

17th. Cannot see any distance, but the ice must be all gone as a heavy sea is breaking on the shoals.

18th. View good; no ice visible out at sea.

PORT LAPERRIERE.

ICE OBSERVATIONS.—OBSERVER, MR. P. C. WOODWORTH.

October, 1885.

1st. First field ice seen to-day at 4 p.m. The ice is loose and there are some bergs driving with it. The pack is apparently moving S.E.

2nd, 4th. The Strait is covered with loose ice. It is heavy old ice, some of it being aground here in the harbour.

8th. Harbour packed tightly with heavy old ice and it can be seen in the Strait and Bay as far as the eye can reach. It is apparently moving north.

14th. No ice visible in Bay or Strait.

29th. About 2 inches of ice formed on the harbour last night but broke up again in the morning.

November, 1885.

1st. No ice in sight.

3rd. A narrow belt of old field ice extends from N.W. to N.E., and about eight miles off shore.

5th. Some field ice in the Strait. Harbour is now frozen over.

7th. Field ice has passed out of sight, only a few stray pieces being seen to-day.

12th. Young ice forming over Bay and Strait.

13th, 14th. Pack of old ice, which has moved down from the north can be seen in the Strait to-day.

15th. Old ice has passed eastward; none now in sight.

17th, 23rd. New ice forming in Bay and Strait.

24th. Straits closely packed with ice.

29th. Bay and Straits full of ice. It is, however, loose and swings with the tide.

December, 1885.

1st. Could get no view of Bay or Strait to-day; blinding snow drift.

2nd. The ice appears closely packed in the Bay and Strait. I am quite certain that all the ice that I have seen in the Strait and Bay is heavy old ice, the separate floe pieces having been cemented together by young ice.

3rd, 4th. Ice in Bay and Strait compact.

5th. Snow drifting.

6th. A little open water shows at one place in the Straits; elsewhere the ice remains solid.

7th, 8th. No open water visible anywhere.

9th, 10th. A little open water in the Bay; none visible in the Straits.

11th. Open water in the Bay extends as far as can be seen. A good deal of open water also shows in the Strait.

13th. No open water visible in the Straits.

14th, 15th. Ice remains the same.

16th. Small spots of open water are numerous in the Straits.

17th. No open water in sight to-day from the station.

20th to 31st. Ice remains much the same; a little open water showing occasionally in both the Bay and Strait.

January, 1886.

1st to 31st. Very little movement in the ice; great banks of vapour constantly rise from what are apparently cracks in the ice; this vapour prevents our observing the movement of the ice at any distance out. Near shore no change has taken place.

February, 1886.

1st to 10th. Vapour banks obstruct the view of both Bay and Strait.
11th. Some open water is visible, apparently about twelve miles off, in both Strait and Bay.
12th. Ice seems to have loosened, as numerous small pools of open water show in the Straits.
13th to 15th. No open water in sight.
16th. A little open water visible in the Strait.
18th, 19th. Banks of vapour again obstruct the view of the Straits.
20th. A little open water shows near the shore.
22nd to 26th. Clouds of vapour, rising some distance off shore, obstruct the view of the Strait.
27th. A little open water, apparently about fifteen miles off shore.

March, 1886.

3rd. Some narrow leads of open water are visible about five miles off shore on the Bay side, but come within half a mile of the island on the Strait's side.
5th to 16th. View obstructed by dense banks of vapour rising from the ice.
17th. A narrow strip of open water a few miles out in the Strait to-night at 11 p.m.
18th. A little open water in both Strait and Bay.
19th to 21st. Ice remains unchanged, the same narrow strip of open water still showing in both Strait and Bay.
22nd, 23rd. Ice moving with the tide; open water showing occasionally.
24th. Ice off the shore, open water clear in to the western side of the island to-day.
25th, 26th. Stormy, with drifting snow; view of the Straits obscured.
27th to 29th. Hazy in Bay and Straits.
30th. There is a strip of open water in the Strait about two miles off shore, which is about four miles in width, extending east and west, as far as can be seen.
31st. Foggy over the Bay and Straits.

April, 1886.

2nd, 3rd. More open water than before; it is now, I estimate, about ten miles from ice to ice, and the open water extends from the north-west in the Bay round to the eastward in the Straits as far as can be seen.
4th. The open water reported yesterday is now all closed, but the ice is loose and moves freely with the tide; spots of open water show in different places.
5th to 9th. A little open water always seen in both Bay and Strait.
10th. No open water in the Straits to-day.
11th. Weather thick; cannot see any distance.
12th, 13th, 14th, 15th, 16th. Only a little open water shows occasionally.
20th, 23rd. More open water than has been seen for some time, but principally in the Bay; very little in the Straits.
29th. Very heavy ice in both Straits and Bay; no open water in the Strait.
30th. No open water in sight.

May, 1886.

2nd. A little open water shows in both Bay and Strait.
3rd to 5th. Snowing and drifting.
6th to 15th. Open water is seen every day in narrow leads, shifting as the ice moves with the tide.
16th. Very stormy.
17th to 20th. Narrow leads of open water in the Bay. None reported in the Straits.

21st. The ice in the Straits is looser, and some open water shows there in places, but the ice is very heavy, and of a deep blue color.

22nd. From the top of one of the hills open water shows in the Bay, about 15 miles in width; this extends into the Strait, where it is apparently from 10 to 12 miles in width.

23rd to 31st. Open water in narrow leads is seen every day; they open and close with the phases of the tide.

June, 1886.

1st to 6th. Streaks of open water seen every day, in both Bay and Strait.

8th. A long narrow lead of water in the Straits to-day.

17th. Ice in Straits is very loose; a great deal of open water shows.

18th, 19th. Ice continues loose.

20th. The ice near the shore, is getting quite thin and is full of holes.

21st at 3 a.m. The floe broke away from the harbour's mouth and drifted to the westward, leaving clear water for a considerable distance.

22nd, 23rd. Ice quite loose. There would, I think, be now no difficulty in a steamship making a passage into the Bay.

24th, 26th. Ice continued loose.

27th. Ice has closed up again completely; no open water is visible.

28th to 30th. Ice loosened out in the Straits again, but not to any great extent, only small pools of open water showing. In the Bay the ice swings right off to the horizon, and comes back with the tide.

July, 1886.

1st. No open water visible in the Strait.

2nd. Ice in Straits much the same, though a few small pools of open water show some distance out. In the Bay the water sky extends from S.W. nearly to N.W. and the freedom with which the pack swings off, indicates that there is not a great breadth of ice.

3rd. Ice in the Bay remains heavy, but there is a narrow lead of open water formed under the shores of the island which extends well out into the Bay.

4th. At 3 a.m. the water still showed close to the island, but at 11 a.m. it had closed up again.

5th to 9th. Weather thick over the Straits, could not see any distance.

10th. Ice in the Strait is quite slack, and by no means so heavy as it was.

11th. Examined the Straits from the top of a high hill to north of harbour. Ice compact for a long distance out, and then a lead of open water shows, apparently extending to Nottingham Island.

12th. A bank of fog rests on the horizon, apparently where the open water was seen yesterday.

13th, 14th. Ice in the Straits remains compact.

15th. Harbour ice begins to break up.

16th. Straits full of heavy ice. No open water is visible.

17th, 18th. Ice loosened a good deal, and now on the night of the 18th, our harbour ice is completely broken up, and heavy ice from the Bay has drifted in.

19th, A good deal of open water shows in the Straits to-day, the run of the belts of ice being about parallel to the shore. At 1.45 p.m. saw the "Alert" away to N.E.

20th. Foggy to-day. "Alert" got into the harbour and anchored, a little before noon.

24th. More open water visible in the Straits to-day than I have yet seen.

25th. Ice out in the Strait seems quite loose; the "Alert" left this morning but at 2 p.m. was seen; apparently stuck fast in the pack.

26th. Foggy.

27th. A large ship, supposed to be a whaler, passed to day. Ice quite slack all about.

28th, 30th. The amount of ice in both Bay and Strait diminishes daily. Eskimo are coming over from the mainland in their kayaks.

August.

2nd. There is now more open water to be seen in both Strait and Bay than there is ice, and the ice is very slack.

3rd. Harbour drifted nearly full of heavy ice.

4th. Open water as far as can be seen.

13th. There now appear in the Straits two narrow belts of ice, about one mile in width, and apparently from 10 to 15 miles in length.

22nd. Not a particle of ice visible in any direction, nor was any more seen from this date to the end of the month.

31st. "Alert" in the harbour, house being taken down; all observations discontinued.

SUMMARY OF ICE REPORTS OF THE STATIONS.

For the benefit of those who cannot afford the time to examine and compare the ice reports of the two years, I give the following summary of the facts observed in both seasons.

At Port Laperrière, in the spring of 1885, a good deal of open water was seen during the early part of the month of June. but the Straits are not reported as at all clear until 17th July; the last of the ice disappearing on 22nd August, just as the fresh water ice begins to form, on the inland lakes. In 1886, some open water showed in the month of March. On 17th June the observer reports the ice quite loose, and thinks Straits navigable. On the 23rd the ice however closed in again almost at once, and up to and including 16th July the Straits are full of heavy ice, which gets loose on the 19th, and by the 26th the Straits are considered navigable; the first day on which no ice in sight is reported, being 22nd August, the same date to a day, as in 1885.

On the other side of the Straits, at Port de Boucherville, on Nottingham Island; in the spring of 1885; 11th July is the first day that any considerable amount of open water is reported; 24th July, the ice is loose in every direction; and the last ice is seen on 13th August. In 1886, on 13th July, first heard the wash of the sea, and though the ice closed in again on the 9th August, it had all left by 17th August.

At Stupart's Bay in 1885, on 3rd June, Eskimo report that water could be seen, but up to 20th July no large amount of open water is reported; the last ice was seen on 8th August. In 1886; 23rd July, ice reported quite loose, the observer remarking "Straits now navigable;" the last ice seen was on 19th August. I may add that in 1884 the last ice was seen here on the 8th of September.

At Ashe Inlet, in 1885, from 10th to 26th June, the ice was loose, but about the latter date it came in on the shore again, remaining with scarcely a break up to 21st August; there was, however, clear water reported some 10 or 12 miles off shore during a great part of July. In 1886, a good deal of open water was seen in April, and on 5th June the ice moved off shore, remaining clear several days, subsequently going off again about 11th July. On 21st July, it is reported, ice in tight again, no open water in sight. The ice finally disappeared on 16th August.

At Port Burwell, in 1885; there was a deal of open water seen during July, but the ice always closed in again. The "Alert" got into harbour here on 4th August. Ice finally disappeared on 20th August. In 1886, from 13th to 20th June the ice was loose, but from the latter date to the end of July a great deal of ice was seen. 3rd August is the first day on which the entry is made, "no ice in sight."

The comparison of the closing of the two seasons, in the fall of the years 1884 and 1885, is given below.

Port Laperrière and Nottingham Island. During the season of 1884, the field ice never left the Nottingham Island, but remained there, swinging to and fro with the tide, all summer. On 2nd October, at Nottingham Island, the Straits are reported full of ice as far as can be seen, and the date of the final closing fixed by the observer there was 26th October. At Port Laperrière, first ice 19th October. Straits closed, apparently full of ice, 22nd October.

In 1885, at Nottingham Island, first ice 25th September. Straits full and finally closed on 26th October. At Port Laperrière, on the opposite side of the Straits, the first ice was seen on 1st October; it came down in considerable quantity, but owing to heavy weather and westerly gales did not set tight till 2nd December.

At Stupart's Bay, in 1884, first ice 22nd October, but observer does not consider Straits closed at that point until 7th December.

In 1885, temporarily closed 14th November, but this ice moving east, were finally closed 6th December.

At Ashe Inlet, in 1884, first ice is reported 14th November, and Straits finally closed 21st November. In 1885, first ice 26th October, but Straits not closed till 6th December.

At Port Burwell the observer reports, in 1884, first ice 4th November; Straits apparently full on 12th November. In 1885, first ice 20th November; Straits apparently closed 30th November.

NOTES ON THE ICE IN HUDSON'S STRAITS AND BAY.

In considering the question of the quantity and movements of the ice in Hudson's Straits, the first point that arises is whether the only ice to be met with there is that formed in the immediate locality, or whether there are sources of supply beyond.

We have now had voyages on three years to Hudson's Straits, and it is certainly legitimate to assume that we have met with all the kinds of ice which are at any time to be found in these regions. I consider that they may be divided into three types or classes:—First, there are in Hudson's Straits at all times of the year, icebergs; second, up to the end of July or beginning of August there is much young floe ice, by this is meant the ice which has been formed during the winter immediately preceding. Its thickness is variously reported from 7 feet 6 inches at the harbour on Marble Island to 3 feet 10 inches at Port Burwell, in the eastern entrance of the Straits. A mean between these two measures would be, I consider, a fair average, for the thickness of this class of ice, when met with in Hudson's Straits, say somewhere about 5 feet of solid blue ice; covering this ice is a sheet of snow packed solid and as hard as the ice itself, and, like the ice, of varying depth. In the month of July 2 feet would probably be the average depth of this cap or crust of snow, thus making the total depth of ice and snow together from 7 to 9 feet. This ice honeycombs very quickly, and in July is generally full of water holes, which occasionally are so extensive that they give a floe of this description the appearance of being made up of a number of detached pieces. I have indeed more than once, forced the ship into a floe of this kind, only to find that there was no give to it at all, and nothing to be done but to pull astern, and go on coasting round the sheet.

The third type of ice is what I called in my first year's report the "heavy Arctic ice." This ice is of every thickness, from 10 to 40 feet; it is the product of many winters in which it has been growing in thickness, both below by freezing, and above by the accumulation of the successive winters' snows.

In early July large masses of this heavy old ice are met with in Hudson's Straits, it can be readily distinguished from the young floe of the single winter's production by its surface being always rough and hummocky; it also quickly discolors, turning a foxey color, and, besides being hummocky, the surface is covered with crater like

holes, full, in most instances, of the finest fresh water. It was indeed quite a common occurrence to put the ship alongside a piece of old ice and putting out the suction hose to fill the tanks with fresh water in a few minutes by means of the steam pump.

We have then these three kinds of ice, viz., (1) icebergs; (2) young floe ice, of single winter's growth; (3) heavy Arctic, or old ice.

Our observations made now during three seasons show that icebergs are present at all times of the year; that young ice makes to a considerable thickness before the 1st December, and that the old ice is occasionally present in the Straits, at the western end, during the whole season; that at other times its final disappearance takes place at some date in August, and that it returns in force usually about the latter part of October.

In considering the quantity and movements of this ice during the season in which navigation is possible, it is desirable that I should again point out, that the physical and geographical features of the region, are of a most unpromising nature. First, in regard to temperature, I am convinced that the mean monthly temperatures proven now to exist preclude all ideas of the possibility of navigating the Straits from November to April, inclusive. In May, June and July, large quantities of ice are present in the Straits, and as the average temperature of the western end of the Straits in May is 23° Fah., or 5½° below the freezing point of salt water, the ice does not begin to give way in this month. By the months of June and July the temperature here has risen to 35° and 40° respectively, and the ice honeycombs and melts rapidly; but judging from the reports of the stations and our own experience it takes all of June, and generally part of July, to reduce the quantity sufficiently, to permit of the Straits being navigated for the purposes of commerce.

The general direction of Hudson's Straits at the eastern end, is about N.W. and S.E. (true), and across the mouth of the Straits, flows persistently the great Arctic current, carrying with it, not only the giant bergs, from the Humboldt and other glaciers, but field ice from the Arctic Sea coming down the East Greenland coast, together with all that comes down Davis' Straits and from out of its many bays and fjords. The quantity of this ice, which passes down across the mouth of Hudson's Straits is enormous, nor does it all pass across; a great deal of it is carried right into Hudson's Straits to the south of Resolution Island; more comes in through Gabriel Straits and thence flows westward along the north shore of Hudson's Straits. This westerly set apparently terminates about the eastern side of Salisbury Island, because the bergs are seen to come in the Straits, and to pass up the north side going west beyond Ashe Inlet; but at Nottingham Island only one is reported as having been seen; at Stupart's Bay they are frequently reported going east. It is therefore a legitimate conclusion, that the current from Davis' Straits flows west along the north shore of Hudson's Straits, and east on the south side. The breadth of ice outside of Hudson's Straits varies greatly from time to time. I have been told of its being 120 miles off in March, and this year, in the end of May, Capt. Guy, of the "Arctic," says: "We found the south-west ice extending off Resolution Island from 40 to 50 miles of tight ice, and outside of this from 10 to 20 miles of slack ice"; showing up to the 25th of May, this year, an impenetrable barrier of 50 miles of tight ice between navigable water and the entrance of Hudson's Straits. This mass of ice outside, pens up the ice in Hudson's Straits, and it is only after a westerly blow of some duration, that it moves off to the eastward and permits of the ice moving out. About the end of June or beginning of July, the bulk of the northern ice has passed south of Cape Chidley, and the Hudson's Straits ice is free to pass out, but at this season of the year the westerly winds form only about 30 per cent. of the total, hence the discharge is slow and vast quantities of this ice disappear in the Straits and Ungava Bay under the influence of the rising temperature of both air and sea.

It will be admitted that with the experience extending to centuries, which the Hudson's Bay Company have if it were possible for them to get their ships in earlier they would endeavour to do so; inasmuch as the detention of one of their ships over a winter in the bay, entails loss of markets, more or less undue wear and tear of vessel, and the additional expense of wages and maintenance of the crew. I have

examined the records of 116 consecutive arrivals at York Factory and find that the average date is September 4th. Of the 116, 48 arrived in August; earliest date, 6th August. The latest arrival was the 7th October, on which occasion the ship wintered in the bay.

There is no question, but that the year in which the ship arrived 6th August, must have been an exceptionally favourable one, because of all the August arrivals only 13 arrived prior to the 20th of the month, and in considering the question of the navigability of the Straits by steamships for the ordinary purposes of commerce, I am of the opinion that steam will not lengthen the season at the beginning more than a month to five weeks, so that our own experience, and that of the Hudson's Bay ships, points to the first half of July as being the earliest date at which the Straits may be considered navigable for the purposes of commerce, by steamships fortified for ice navigation, and at the same time capable of being used profitably as freight carriers.

It has been held by some that the ice in Hudson's Straits was so light and so much broken up that there was no risk of an ordinary vessel being crushed in it. I am informed that one of the American whaling vessels was crushed in 1885, and the Hudson's Bay Company some years since lost a vessel by the ice in the Strait.

The Hakluyt Society have published a work entitled "The Geography of Hudson's Bay," by Capt. Coats.

Capt. Coats was an officer in the Hudson's Bay Company, who commanded vessels sailing into Hudson's Bay from 1727 to 1751. During this time he was twice crushed in the ice, and in his geography he says: "In the year 1727 when near the meridian off Cape Farewell, when running through the ice with small sail, two pieces of ice shut upon us and sunk our ship. Again in 1736, being entangled in the ice six leagues within Cape Resolution when the ice shut upon us by the tides only (for it was dead calm) and crushed our sides in and sunk her in 20 minutes."

The tidal currents in the Straits flow with great rapidity, especially at the eastern end of the Strait, round and about the Button's Islands, and at the western end near the Digges Islands; any vessel getting entangled in the running ice in these currents is sure to meet with hard usage, if not with actual disaster. The ice does not move with uniform speed, but wheels and whirls in every direction the heavier floe pieces, some of them approaching the size of small bergs tearing through the pack, leaving a wake of clear water for a short distance in rear of them which is almost immediately filled again, the ice rushing together, and the smaller pieces crushed or lifted out of the water as the opposing lines meet. It is on account of these currents, that Capt. Coats advises the mariner navigating Hudson's Straits not to enter the Straits till the first week of July, by which time, he says, the ice is usually sufficiently broken up to make it safe for a ship. I cannot better show how the uncertainties of these tidal currents defy the calculations of the navigator than by instancing the case of Capt. Parry's expedition with the "Fury" and "Hecla" in 1821. Capt. Parry arrived off Resolution Island on 2nd July, and from this date the "Fury" and "Hecla" were drifting in the ice, working as opportunity offered. They reached the Lower Savage Islands on 18th July. On 6th July the two ships were close together, and were tightly beset in the ice, the weather then shut down thick, but neither ship was released from the close grip of the ice. On the following day when the weather cleared, the "Hecla" had drifted eleven miles away from her consort. I have examined the published records of a number of voyages made by the early explorers of the seventeenth century, and those of later date. In all the testimony is the same, that there is a large quantity of ice in Hudson's Straits during the month of July, more or less broken up, still it is always there.

In concluding these notes on the ice, it may not be out of place to state that whilst I am of opinion there will always be more or less fluctuation in the date of the opening of practical navigation for the purposes of commerce, the ship owner who sends in a freight-carrying steamer before the 15th of July, will almost certainly be subjected to such delays as will add very seriously to the cost of the voyage; indeed it is by no means unlikely that given two similar steamships, one entering

Hudson's Straits, on 5th July and the other on the 15th, the second steamer might pass the first, and get through with little delay.

In regard to the closing of the season so far as obstruction from ice is concerned the end of October seems to be the time when the heavy old ice comes down in force, and although in 1886 this ice was driven eastwards by a heavy gale and the Strait remained open for some time longer, the temperatures have in November fallen so low, and the days have become so short, that the risks of navigation are seriously agumented. In estimating the period of navigation of an ordinary year I should say from 15th July to 15th October with a possibility of navigation from 1st July to 1st November, but in the first half of July and indeed occasionally in the latter half there will always be delays, and later than 15th October the risks of navigation are so increased, that the question of insurance would in all probability settle the date.

NOTES BY OBSERVERS.

Station No. 1, Port Burwell—Mr. G. Shaw.

November, 1886.

1st. Up to this date there has been no steady snow storm, it falls in short showers and is continually drifting.

10th. Heavy gale to-night; squalls upwards of 65 miles an hour.

17th. Snow does not seem to stay on the land, it is literally blown out to sea, the ravines and hollows filling up level.

19th. Temperature fell below zero to-night for the first time.

December, 1885.

6th. Wind to-day a perfect hurricane.

7th. Brilliant aurora to-night.

15th. I estimate total snowfall at about two feet; it has been perfectly impossible to measure it.

19th. Parhelia visible at 11 a.m.

25th, 26th. Lunar halos. Eskimo visited us on the 25th.

31st. Heavy snow in a.m.

January, 1886.

10th. Heavy gale, but squally.

14th. Brilliant aurora morning and evening; parhelia at 11 a.m.

17th, 18th. Heavy gale; snow drifting.

22nd. Aurora bright at 7 and 11 p.m, Class 4.

23rd, 24th. Heavy gale.

31st. Our first feathered visitor for some time; a raven was flying about the station all day.

February, 1886.

6th. A dark, smoky-colored circle surrounded the sun to-day.

14th, 15th, 16th, 17th. Heavy gale of wind, with scarcely any intermission.

18th. Parhelia in a.m.

28th. Another very heavy gale; wind 70 miles an hour in squalls. The raven has remained with us all this month.

March, 1886.

12th, 13th. Parhelia in a.m. each day.
14th. Lately we have seen quite a number of ravens.
17th. Parhelia at sunrise.
20th. 21st. Brilliant solar halos, with prismatic colors, showing distinctly.
22nd. Parhelia at 9:30 a.m.
23rd. Three ptarmigan seen to-day; this is the first appearance of these birds.
30th. Solar corona at 9 a.m. to-day, brilliant aurora at night.
31st. Snowing and drifting; cleared at night; aurora: Class 3.

April, 1886.

2nd. Heavy gale from 6 p.m. of 1st to 6 p.m. to-day. Wind averaged nearly 60 miles per hour.
15th. Brilliant aurora at 11 p.m.
16th. Solar halo at 11 a.m.
17th. Three heavy showers of rain fell to-day.
25th. Snow birds seen to-day for the first time.
26th. Ptarmigan are now getting plentiful. Saw an owl to-day. Snow melting with the south-east wind.

May, 1886.

1st to 4th. About a foot of fresh snow has fallen this month.
13th. Temperature in the sun by ordinary thermometer 66°, shade temperature 33°.
18th, 19th, 20th. Hail fell on each day.
25th. First sign of sea birds, saw one gull to-day.
28th. Geese passing north in flocks.
31st. First signs of vegetation coming to life; some of the plants are coming up green in sheltered places.

June, 1886.

4th. A very heavy North and N.E. gale and snow storm.
16th, 17th. Brilliant aurora in N. and N.E. Parhelia visible at 7:30 p.m. on 17th.
19th. Very heavy snow from 9:30 p.m of 18th to 3:30 p.m. to-day.
21st. Brilliant aurora in N. and N.E. at 11 p.m.
22nd. The ground is drying up very rapidly.
26th. Solar halo at 4.30 p.m.
30th. Solar halo at 1:30 p.m, very distinct and bright in coloring.

July, 1886.

1st, 2nd. Auroras at 11 p m. each night.
5th. Thunder storm between 3 and 4 a.m., the first that we have had.
10th. Solar corona at 8 p.m.
15th. Weather very dark and gloomy. Heard distant thunder to-day.
19th. Thermometer in the sun this forenoon showed 79°; shade temperature at the same time 54°.
25th. Easterly gale to-night, wind reaching 45 miles per hour.

August, 1886.

6th. Large numbers of sea birds in the harbor to-day.
7th. Thunder and lightning, but appears to be some distance off.
20th. Heard distant thunder this morning.
28th. Flurries of snow falling again. Tops of the hills are covered.

September, 1886.

7th. Ground is frozen hard this morning.
26th. Fresh water ponds and lakes are frozen over.

ASHE INLET, STATION NO. 3.

Mr. J. W. Tyrell, P.L.S., Observer.

September, 1885.

29th. Two peals of thunder heard to-day; wind blowing 60 miles an hour at 11:30 p.m.

October, 1885.

2nd. Brilliant aurora.
12th. First natives arrived.
17th. Lamps lighted at 4.40 p.m.
22nd. Eleven more Eskimo arrived to-day.

November, 1885.

5th. Tide staff destroyed by ice.
20th. 3 p.m. Observation was taken by lamp light to-day.

December, 1885.

8th. Lamps lighted at 2 p.m.
22nd, 23rd. Lunar halos.

January, 1886.

10th. Five Eskimo arrived, having walked over White Straits on loose ice.
20th. Faint double lunar halo.

February.

11th. 3 a.m. Mercurial thermometers frozen.
16th. Lunar halo visible.
18th. Lunar halo with large bright cross in the centre.
20th. Captain Nipgin, Agent of the R. S. Williams Company visited station to-day. His station is at Spicer Harbor, west of this island.

March, 1886.

3rd. By base line, measured on the harbor ice determined the height of Look Out Point, and the station door sill. The heights obtained are—Look Out. 247 feet, Station door sill 40 feet above M. S. L.
21st. Shot a bear at the door of the station house this morning at 6 o'clock.
22nd. First appearance of ravens.
28th. Brilliant aurora at 11 p.m.

April 1886.

1st. Two snow birds seen for the first time this morning.
3rd. Ptarmigan have returned, first seen this afternoon.
7th. A number of walrus are off the mouth of the harbor to-day.

May 1886.

4th. A number of natives arrived to-day.
14th. First fall of rain.
15th. Heavy rain.
25th. Snow disappearing rapidly.
30th. The two days rain has nearly removed the snow—it has all gone from the highlands.

June, 1886.

6th. Steamer "Arctic" arrived and made fast to the ice at the entrance of the harbor.
9th. Twenty-three Eskimo assisted us in building a beacon on the bluff.
25th. The river which runs into the head of the inlet is rapidly breaking up the ice there.

July, 1886.

11th. "Alert" arrived at 4 a.m.
20th. Heavy swell heaving in from the south.

August, 1886.

28th. Snow fell to-day.

September, 1886.

2nd. Wild geese are flying south in large flocks.
5th. Snow nearly covers the ground
12th. "Alert" arrived; station relieved.

STUPART'S BAY—NOTES BY OBSERVER.

MR. F. F. PAYNE.

August, 1885.

22nd. Arrived at Stupart's Bay and took charge of station.
26th. Meteorological and other observations commenced to-day.
29th. A great number of Eskimo about the house begging for food.
30th. Bathed in the sea to-day. All Eskimo left for the deer hunting ground.

September, 1885.

5th. Some specimens of birds, fishes and insects taken to-day.
10th. Eskimo seen collecting large quantities of shell fish.
14th. Eskimo returned from the deer hunt bringing several deer.
15th. The first wintry day.
19th. Ice on small lakes now is a quarter of an inch in thickness.
20th. The D. S. S. "Alert" arrived, homeward bound.
24th. The D. S. S. "Alert" left here to-day.
29th. A strong gale is blowing.

October 1885.

8th. Eskimo seen eating quantities of seaweed.
13th. A great number of Eskimo here to day.
15th. A warm and most enjoyable day. Flies numerous.
21st. A snow wall was built round the house.
25th. Lunar halo seen.
29th. Some Eskimo forcibly attempted to enter the house but were put out without much trouble.

November, 1885.

5th. A bright solar halo seen.
7th. A large seal was shot and given to the Eskimo.
8th. Ice on lakes now measures 1 foot 2 inches.
15th. Some large walrus were seen to-day.
16th. Some fine salmon brought to the station by Eskimo.
19th. Lunar halo seen.
21st. Solar halo seen.
27th. Solar halo was seen.

December, 1885.

3rd. We still continue to draw water from a neighboring spring.
5th. At 12.50 p.m. wind suddenly fell from 45 miles to 8 miles per hour.
12th. Lunar halo at 4 30 p.m.
14th. Ice on lakes measures 22 inches.
15th. Solar halo at 11 a.m.
21st. All fresh water springs are now frozen up.
22nd. Lunar corona at 10:15 p.m.
25th. Christmas Day. Lunar corona seen.
27th. Ice on lakes measures 26 inches.
31st. Solar halo at 10:30 a.m.

January, 1886.

8th. A perfectly clear sky bore a purple color at 3 p. m.
19th. Lunar halo at 11 p.m.
20th. Lunar corona at 11 p.m.
21st. Lunar halo at 11 p.m.
22nd. Lunar halo at 11 p.m.
23rd. Heavy gale.
28th. Eskimo are badly off for food.

February, 1886.

1st. Bright halo and "sun dogs" seen to-day.
3rd. An exciting game of football with the Eskimo.
6th. An Eskimo burglar captured to-day.
9th. Solar halo at 11 a.m.
12th. Lunar halo at 11 p.m.
13th. The sun felt unusually warm to-day.
14th. Some venison was brought to the station by Eskimo.
15th. Lunar halo at 11 p.m.
16th. Solar halo, 3 p.m.; lunar halo, 11 p.m.
17th. Lunar halo 7 p.m. and 11 p.m. Meteor seen at 11:07 p.m. Fell toward S.S.E.
21st. Lunar halo 11 p.m.
22nd. Solar halo 11 a.m.

23rd. At 10 a.m. there was an extraordinary bright red sky to the southward, this was followed by a Class IV aurora in the same position at night. 8:30 a.m. solar halo.

24th. Exactly the same phenomena as noted yesterday was seen to-day.

25th. Red sky at 9:15 a.m.

27th. A heavy gale all day.

March, 1886.

2nd. Solar halo at 3.20 p.m. Dense fog 7 a.m.

3rd. Dense fog.

5th. Red sky at 10.20 a.m., S.S.E. Bright aurora at night. Fog.

10th. Brick-red sky seen at 9 a.m.

20th. Lunar corona at 11 p.m. A number of Eskimo made a most daring burglary upon the storehouse during the night, carrying off a quantity of provisions.

21st. Solar halo at 2.30 p.m.

22nd. Lowest temperature 39°.5 occurred to-day.

26th. Another attempt was made at midnight by the Eskimo to take provisions. The door of the storehouse was smashed, but the thieves were put to flight.

27th. Solar halo at 3 p.m.

28th. Solar halo at 11 a.m.

April, 1886.

1st. Letters sent to Fort Chimo by an Eskimo to-day.

4th. Solar halo 12.15 p.m.

5th. A number of Eskimo starving.

8th. An Eskimo was drowned to-day.

12th. Solar halo at 11 a.m.

13th. Solar halo at 5.40 p.m.

16th. Solar halo at 10.45 a.m.

17th. Ice on lakes measures six feet and half an inch.

27th. Solar halo 7 a.m. to 3 p.m.

30th. Was informed of the existence of an immense lake some miles inland, where many Eskimo live.

May, 1886.

1st. Another attempt to force an entrance into my storehouse by Eskimo during last night was frustrated, a watch being kept day and night.

3rd. Sea water ice in an almost land-locked bay, measures 66 inches.

4th. Eskimo are now leaving for the deer hunting ground. Solar halo at 11 a.m.

5th. Solar halo at 12.05 p.m.

7th. Solar halo at 3 p.m.

8th. Solar halo at 11 a.m.

10th. Four Eskimo found in a dying condition from starvation.

12th. All but those Eskimo reduced to helplessness have left this part of the country.

14th. Lunar corona at 10 p.m.

15th. An Eskimo, though well fed with such food as could be procured for him, died this afternoon.

17th. Solar halo at 7 a.m. Some Eskimo returned bringing venison and reindeer tongues.

21st. Letters received from Fort Chimo.

26th. Peas, turnips, spinach and cress were sown to-day.

June, 1886.

2nd. Buoys were put out near dangerous shoals.
4th. An Eskimo child, saved from death by starvation some time ago, died from exposure to cold to-day.
14th. Solar halo at 7 p.m.
17th. Frost is to be found four feet below the surface of the ground.
18th. Two large seals were shot to-day.
30th. Lightning was seen for the first time to-day.

July, 1886.

1st. Beacon on Signal Hill rebuilt.
2nd. Birds, flowers and insects are now numerous.
3rd. Solar halo, 7 a.m. to 3 p.m.
13th. Harbor opened to-day.
17th. Some fine trout were caught to-day.

August, 1886.

11th. A barque seen a few miles from shore.
12th. Barque is still opposite the station and every means have been used to signal her.
13th. Great disappointment. The barque, unheeding our signals, sailed away this afternoon.
15th. Solar halo at 3 p.m.
16th. Lunar corona at 11 p.m.
23rd. Two very old iron cannon and a ship's anchor were found on the shore to-day.
29th. Extraordinary meteorological phenomena noted to-day, evidently caused by immense bush fires in the heart of Labrador.
30th. Water taken from a stream, after a fall of rain, tasted so strongly of smoke it was unfit to drink.

September 1886.

8th. The surface of the ground is now frozen. Seventy wild geese were shot during the past three days.
10th. Solar halo at 11 a.m.
13th. Solar halo at 7 a.m.
16th. Relief ship "Alert" arrived, and was saluted with one of our cannons.
25th. Abandoned station.

NOTTINGHAM ISLAND.

General Notes at Port De Boucherville, By Mr. John McKenzie.

August, 1885.

24th. Landed.
25th. Pin-tailed ducks numerous in harbor.
26th. Barque seen inward bound. Walrus seen off port.
27th. Temperature of sea, 36°.0. Barque to S.SE.
30th. Flock of geese flying East.
31st. Temperature of sea, 33°.0. Geese, loons, and other water fowl on lakes. Saw one deer.

September, 1885.

2nd. 5 p.m. Beautiful halo—colors distinct.

11th. Large flocks of swans. Butterflies. Walrus at entrance to port, but did not succeed in shooting any.

15th. Numbers of white porpoises to be seen occasionally in the harbor.

16th. Half-inch ice on pools.

18th. "Alert" called homeward bound.

20th. Brooks and lakes frozen over—no geese or swans to be seen. Ptarmigan plentiful—partly white.

23rd. One-quarter inch ice on pools. Thin broken ice on shallow coves. Considerable old snow remaining in places. Tried for trout through the ice on lakes, but was unsuccessful.

26th. Strong gale of wind from west (56 miles)—first appearance of ice. Mean temperature of sea for month, from observations taken, 33°.5; maximum, 38°.0; minimum, 29°.8, A few seals were seen during the month around the shore.

October, 1885.

1st. 5.1 inches ice on ponds. Sheltered bays frozen over, Ptarmigan very plentiful along the flats near the shore. Considerable snow inland; drifts very compact.

3rd. Bay north-west of station frozen over, strong enough to bear seals.

9th. Beautiful solar halo, arcs, with parhelia; colors as distinct as an average rainbow.

14th to 24th (inclusive). What would be called "Indian summer" further south appeared to be well marked. Mean temperature for 11 days 29°.43 only 2°.7 below that for September, 6°·22 above that for the previous 13 days of October, and 6°.39 above that for the whole month with light variable winds and a mean cloudiness of 8.54.

27th. First deer shot.

November, 1885.

1st. Ptarmigan assumed their winter plumage some time ago and have nearly all disappeared.

6th. Ice crystals. Also on 8th quite common.

11th. Lakes and brooks covered with half-melted snow; this was noticeable until late in the month. Tops of hills bare with crevices in rocks full of tightly-packed snow. This was the case all winter.

23rd. Colors of a lunar corona well defined—red, yellow, green and blue.

27th. Fifteen inches of ice on lakes. A mean depth of snow on wide valleys, 9 inches. Tops of hills bare. Reindeer were very numerous during the month. We secured a winter supply of fresh meat. The weather was not at all unpleasant during this month.

December, 1885.

3rd. A raven comes around station for food.

17th. Deer disappeared and were not again seen until the middle of February. Seals were not to be seen for some time on shore ice.

31st. 12 to 17 inches snow on valleys, 20 inches ice on lakes under 8 inches of hard-packed snow. Winter set in, in earnest, early in this month. A few white foxes are the only form of animal life visible; towards the latter end of the month, Parhelia with colours well defined are very frequent in the vapour hanging over the open water to south.

January, 1886.

6th. Brilliant meteor fell from N.E. at 7:51 p.m.

Optical phenomena very common during the month. Nearly every night when clear beautiful auroral displays took place—notably on 19th and 30th. Snowfall very light, but drift severe.

February, 1886.

1st. Hills in the mornings often have a misty appearance.

2nd. 13 inches snow on plains. Some 2 feet or more on rough ice at head of bay.

10th. Saw a couple of reindeer—first since early in December.

11th. Two ravens.

15th. Most severe storm of the season, 70 miles of wind from S.W. Snow on open level ice, is laid in a series of parallel waves or ridges. Deposits of sand, mosses, lichens, &c., found on snowdrifts to leeward of hills from winter storms.

Optical phenomena very frequent during the month.

March, 1886.

12th. For the last fortnight or so on cold and tolerably calm days, in the morning it is fine and clear, but towards noon becomes hazy, followed in the evening by a light fall of snow dust.

30th. In the middle of harbor, far from shore, cracks, &c., and under 5 inches snow (but the amount of the latter was variable during the winter), 61 inches ice. temperature of sea was 29°.0 (Faht.).

Optical phenomena numerous during the month.

April, 1886

1st. Deer have shed their antlers—new ones beginning to grow.

5th. Found shallow lakes frozen to bottom.

7th. First appearance of snow melting in shelter of station, also around ashes and other debris.

13th. First of migratory birds—a small snow bird.

20th. Very light silver thaw last night. Noticed for the first time that the edges of the patches of ice in shallow depressions on the bare rocks facing the south were thawing.

28th. 14 ins. snow on big plain to S.W. of station. Small puddles of water form on the rocks during the day. The weather for most of the month was quite pleasant, but particularly the latter part of it. A few bears seen; we have now secured more deer meat than we can use.

May, 1886.

1st. First appearance of sea birds—mers.

15th and 16th. Big snow storm and gale from N. Snow at its max. depth.

18th. Gulls arrived.

20th. Thousands of eider ducks and loons arrived.

21st. Geese flying north.

26th. Snow melting rapidly. Streams of water running down the sides of rocky hills. 6 ins. of sand on valleys N. of station where snow lodged, thawed out; but under the least sod, only an inch or two. Numbers of seals around cracks on shore ice,

27th. First appearance of insect life. A small fly on mossy corners of the rocks.

31st. Snow very soft with large quantities of water underneath. There are still 15 or 16 ins. on plains and S.W. of station, but that around the hills and on the

ice has melted very much this last week. The blue ice on harbor can now be seen, though still covered with 4 or 5 ins. of water and half melted snow. Ptarmigan are still white, but are losing their feathers; snow birds are now numerous and have changed color a good deal.

The month of May was particularly stormy, at least for the first twenty-five days, and when not actually stormy the sky was overcast and gloomy; mean cloudiness for the month was 9·3. It was the most windy month of the year.

June, 1886.

1st. Flocks of geese are now passing north; the grass is beginning to sprout, but is not over the ground yet, some varieties of moss have become green, and small ponds on top of the rocks, from one to two feet deep are nearly thawed out.

2nd. The Arctic willow is opening its buds.

3rd. Sandpipers seen to-day for the first time.

7th. Small purple flowers are coming into bloom.

10th. Spiders first seen.

14th. The plains are now well clear of snow.

21st. The ice on inland lakes is still two feet or more in thickness; grass has run up in places over two inches. Hawks, all kinds of water fowl, and small birds have nests with eggs in them.

30th. The weather with few exceptions was delightful during the whole month, with but little fog and some light rain. The wind for the most part was light and variable, increasing in velocity during the day, and dying down again during the night. This has been by far the finest month of the year.

July, 1886.

3rd. Harbor ice all broken up.

5th. Twenty-three inches of barren sand has thawed out; under a very light sod frost still present at eighteen inches, and in the wet, peaty valleys the ice can still be felt under foot whilst walking.

8th. Light cumulus clouds were seen over the mainland to the south for the first time to-day.

12th. Some varieties of grass are in blossom.

18th. Peculiar smoky atmosphere with smell of burning peat.

15th, 20th. Mean temperature of sea water 33°.5.

21st. Used lamp to read the thermometers at the 11 p.m. observation for the first time since early in May.

22nd. Young ducks are in the salt water.

27th. Harbor is full of "herring bait;" tried a couple of times for codfish but got none; sculpins and smelts are in the harbor in abundance.

29th. Found ice under 4 inches of moss, in a big valley to S.W. of station.

30th. Sand is thawed out for 27 inches, but under a light sod, only 22 inches.

August, 1886.

12th. A thin coating of ice formed on the harbor last night; temperature of the sea this a.m. 34°.

17th. Total and final disappearance of field ice.

18th. A small piece of a rainbow was seen to-day; this is the first seen since landing.

19th. The first and only thunderstorm occurred to-day.

22nd. Saw a brigantine to S.W. of port at 10 a.m. She put about, some six or seven miles from here at 10.30 a.m.

24th. A number of walrus seen to-day.

26th. Vegetation has for some time assumed its autumn tint. I noticed the leaves of the Arctic willow coloured two weeks ago.

28th. To-day made another unsuccessful attempt to find codfish.

September, 1886.

1st. Temperature of the sea 33°8. Flurries of snow.

2nd. Geese are going south in flocks. Under bare sand 30 inches of soil is thawed, but ice is found at 5 or 6 inches under turf.

7th. Half an inch of ice formed on fresh water ponds.

8th. Station abandoned.

NOTES BY OBSERVERS.

Station No. 6—Port Laperière.—Mr. P. C. Woodworth.

September, 1885.

2nd, 6th. Large flocks of wild geese flying south daily.

7th, 21st. The geese and ducks had all left by the 7th, and from this date to the 21st the gulls remained.

October, 1885.

This was quite a wintry and boisterous month.

November, 1885.

1st. The high winds which we have had lately, seem to have blown away a great deal of snow. The average depth now does not exceed five inches.

8th. Auroral display this evening; commenced by a gradual brightening up of the eastern sky, resembling the dawning of day.

29th. Fresh gale this afternoon and the anemometer broke down.

30th. It is impossible to measure the snowfall, for it blows at once off the rocks on to the harbor ice or out to sea, and that on the harbor ice gets swept out occasionally altogether.

December, 1885.

5th. The snow to-day drifted right into the thermometer shed almost, filling it.

7th. We have to keep constantly cleaning the snow out of the thermometer shed. It seems to drift unceasingly.

16th. Lunar halo at 10:10 p.m.

January, 1886.

10th. A raven was seen flying north to-day, first bird of any kind since Dec. 1st.

5th. Brilliant aurora at 11 p.m.

20th. Snowing to-day, but no matter how much snow falls, it does not seem to increase the quantity on the islands; this remains practically the same, and the snow is blown out to sea.

29th. Parhelia seen to-day at 11 a.m. and 3 p.m.

30th. Parhelia again at 3 p.m.

February, 1886.

5th. Solar halo at 3 p.m. A raven was seen here to-day.
9th. Mercury frozen.
10th. Very distinct solar halo.
14th. Solar halo and parhelia.
17th. Lunar halo and very distinct parselenae.

March, 1886.

5th. Got a freshly-killed deer from the Eskimo here to-day. This is the first we have got, and was shot on or near this island.
8th. Double solar halo at 3 p.m. to-day.
9th. Ptarmigan arrived to-day. Shot two, and found what I thought was green spruce buds in their crops.
13th. A peculiar optical phenomenon was noticed to-day at 3 a.m. The moon being about 10° above the horizon a pillar of bright copper-coloured matter appeared resting upon the horizon and extending upwards about 18° to 20°. It passed right through the moon's centre, and its breadth was a little less than the moon's diameter.
17th. Large lunar halo.
30th. Two ravens were seen to day.

April, 1886.

5th. Ducks seen to-day for the first time. They all seem to be flying northward.
6th. Hard hail falling at 11 p.m., with the stars clearly visible at the same time.
9th. First snowbird seen to-day.
16th. Hail falling nearly all day.
25th. More ducks flying north at 11 p.m. to-night.
27th. Saw a Polar bear and two small cubs to-day. Also saw some gulls for the first time this year.
28th. Animal life begins to show abundantly. Numerous walrus, seals and flocks of sea birds are to be seen out in the Straits.
30th. Saw a flock of ptarmigan at 10 a.m. to-day.

May, 1886.

2nd. Enormous flights of ducks seen out in the Bay to-day.
3rd, 4th and 5th. The most stormy weather since my arrival at the station last August.
7th. Saw a large right whale to-day.
15th, 16th. Heavy gales and snow storms; average velocity of the wind forty miles an hour, taking miles run by the anemometer.
17th. Large flocks of loons passing north.
21st. First shower of rain at 8.30 a.m. to-day.
27th. Saw some wild geese to-day flying north.
29th. More geese going north, one flock of white waveys, and another seen at a distance are, I think, the grey Canada goose.

June, 1886.

9th. Saw a swan to-day, this is the first that has been seen this year.
10th. Eskimo came over from the mainland in their kayaks to-day.
23rd. Ice looked so loose to-day that I think a steamship could have made her way through.

July, 1886.

19th. Saw a steamer in the offing to-day.
20th. "Alert" arrived.
27th. Saw a large barque rigged vessel out in the Straits, working S.W.
28th. Eskimo arrived here to-day in their kayaks.

August, 1886.

2nd. Two Eskimo arrived to-day.
5th. Heard the wash of the sea to-day.
22nd. Shot three bears to-day, they were swimming in the harbour.
23rd. Saw a small brigantine about five miles off the Beacon Light.
26th. A large flock of geese flying south to-day at 3 p.m.
29th. Dense smoke and fog, intense darkness at night, with heavy rain on the morning of the 30th. The rain water was tainted and discoloured.
30th. Dominion Steamship "Alert" arrived.
31st. Station closed.

FORT CHURCHILL.

OBSERVER—MR. JOHN R. SPENCER.

August, 1885.

31st. Snow storm.

September, 1885.

19th. Frost recorded.
23rd. Thermometer 29° at 10 p.m.
24th. Ice forming.

October, 1885.

1st. Severe snow storm with easterly gale.
16th. Thunder storm during the night.
28th. Thermometer fell below zero.

November, 1885.

3rd. River frozen over below Mosquito Point.
13th. Raining at the Old Fort, 4 miles north.

December, 1885.

4th. River frozen over.
18th. Brilliant meteor at 7.40 a.m.

January, 1886.

19th. Mercury frozen.

February, 1886.

12th. Very deep snow.

March, 1886.

24th. Snow birds have returned.

April, 1886.

5th. Snow is heaped in mountains round the fort.
15th. First shower of rain. Glazed frost.
22nd. First goose seen going north.

May, 1886.

4th. The weather has been very bad and peculiarly stormy for the season.

June, 1886.

10th. River open up at Mosquito Point.
15th. Snowing.
17th. River open to the mouth.
22nd. First thunderstorm. Temperature 70°.
27th. Thunderstorm. High winds.
29th. Thunderstorm, with large hail.

July, 1886.

4th, 5th, 11th. Thunderstorms.
11th. Dense smoke.
18th, 23rd. Thunderstorms.
29th. "Alert" arrived.

August, 1886.

4th, 10th. Thunderstorms.

NOTES BY OBSERVERS.

STATION, BELLE ISLE ISLAND LIGHTHOUSE.—OBSERVER MR. COLTON.

November, 1885.

4th. Fresh gale; wet snow and fog.
10th. Fresh gale; hail and heavy rain.
24th. Newfoundland steamer, bound south, was the last vessel seen.

December, 1885.

4th. Fresh gale from north, with snow.
8th. Strong gale and dark, gloomy weather.
28th. Fresh gale with heavy rain; temperature fell 49° in twenty-four hours.

January, 1886.

6th. Gale from east, with heavy rain.
15th. Strong gale; landing wharf carried away; and the spray is frozen 100 feet above high water mark.

March, 1886.

1st. Strong gale, with squalls of wet snow.
4th. 4 p.m., fog bow from N.E. to E.S.E.
9th. Large quantities of heavy ice and 200 icebergs in the Straits.

April, 1886.

4th. First sealing steamer seen to the south.

May, 1886.

1st. Heavy jam of Arctic ice in the Straits.
15th. Straits still full of ice.
24th. Straits clear of ice.

June, 1886.

10th. 1 a.m. Thermometer 32°.
16th. Hoar frost.
28th. Mid-day thermometer 35°.

July, 1886.

2nd, 7 p.m. Sudden shift of wind to north, with heavy squalls and rain; 8 p.m., blowing a heavy gale; sea white with foam and heavy rain; 5·09 inches of rain fell up to 6 a.m. of the 3rd.
7th. Strong breeze and dense fog. "Scotswood," of St. Johns, a total wreck.
28th. Strong breeze and thick, wet fog.

August, 1886.

4th. Strong gale and heavy rain.
14th. Frost during the night.

NOTES BY OBSERVERS AT YORK FACTORY.

1846.

March 9th. Began hay hauling.
16th. Began cutting schooner out.
April 4th. Raining.
11th. Finished hauling wood.
May 1st. First goose killed.
5th. River began breaking up.
7th. River full of broken ice.
June 8th. Mosquitoes numerous.
July 26th. Thunder storm.
September 18th. Snowing.
19th. Ship left for England.
October 15th. River full of ice.
November 25. River fast.

1847.

April 24th. Rain.
May 9th. First goose killed.
June 2nd. Ice in river broke up.
12th. Snowing.
24th. Thunder.
July 7th. Thermometer read 90.5°
August 25th. Ship arrived.
September 2nd. First snow.
November 15th. River fast at Fort.

1848.

May 21st. River broke up.
28th. Raining.
June 22nd. Heavy snow storm.
28th. First thunder.
September 8th. Snowing.
9th. Frost.
October 26th. Raining.

1849.

April 1st. Snow birds seen.
May 5th. First goose seen.
6th. First rain.
18th. River breaking up.
June 4th. Last snow.
August 15th. Ship arrived.
17th. Thunder storm.
September 27th. Snow showers.
October 30th. First ice on river.
November 9th. No ice on river.
15th. Last rain.
26th. River set fast.

1842.

Sept. 8th. Frost this morning. Temperature 8 a.m., 29°.5.
15th. Ship left.
20th. Snowing.
October 18th. Ice in river.
November 5th. River nearly clear of ice.
11th. River set fast.

1843.

April 6th. First rain.
May 22nd. River commenced breaking up.
29th. River ice broken up.
June 14th. Snow.
19th. Frost.
23rd. First thunder storm.
July 16th. Heavy thunder storm, beacon struck by lightning.
19th. One canoe with three passengers started.
August 19th. Haying finished. Twenty-two boats start for fishing.
September 17th. Snow showers.
October 7th. North goose boats arrived.
19th. River full of ice.
November 11th. River set fast.

1844.

April 1st. First thunder.
11th. Lightning, thunder and hail.
May 13th. River began breaking up.
14th. Choked with ice.
20th. River clear below old factory.
30th and 31st. Snowing all day.
June 8th. Snowing all day.
9th. Light snow.
July 2nd. Snow.
September 14th. Ship started.
19th. Frost.
October 15th. Snowing.

1845.

April 11th. Raining.
May 9th. First goose seen.
22nd. River opposite Fort broke up.
June 14th. Snowing.
26th. First thunder.
August 31st. Light snow.
September 11th. Ship left for England.
November 24th. River set fast.

1850.

May 13th. First goose seen.
14th. First rain.
27th. Last snow.
28th. River breaking up.
June 1st. River clear.
21st. Thunder storm.
July 31st. Hay stacks made.
August 8th. Ship arrived.
September 26th. First snow.
October 22nd. Last rain.
27th. River full of ice.
November 28th. River set fast.

1851.

May 5th. First goose seen.
21st. River broke up.
June 9th. Last snow.
18th. Rain.
August 9th. Hay stacks built.
12th. Ship arrived.
September 9th. Ship starts.
October 8th. Last rain.
14th. First snow.
December 10th. River set fast.

1852.

April 30th. First goose killed.
May 9th. First rain.
17th. River broke up.

1852

June 7th. Last snow.
July 14th. Thunder storm.
August 15th. Ship arrived.
September 7th. Finished hay making.
12th. First snow.
16th. Ship started.
October 17th. River full of ice.
November 8th. River fast.

1853.

May 12th. First rain.
26th. River breaking up.
30th. River clear.
June 14th. First thunder.
22nd. Last snow.
September 11th. Ship started.
12th. First snow.
October 23rd. Ice in river.
November 9th. River fast.

1854.

April 17th. First rain.
May 9th. River began breaking up.
20th. Last snow.
23rd. River clear.

THE RESOURCES OF HUDSON BAY AND STRAIT.

THE FISHERIES.

Having now completed my third voyage to Hudson's Bay, I desire to draw your attention to the value of the fisheries in that part of the Dominion of Canada. The Government of Newfoundland exercises jurisdiction over that part of the Labrador which lies to the eastward of a line joining Cape Chidley with the mouth of the river running into Blanc Sablon Bay, in the Straits of Belle Isle; to the west of this line lies all the coast line of Ungava Bay, Hudson's Straits and Bay.

The fish and mammals possessing commercial value in these waters are the right whale, the white whale, the uni or narwhal, the porpoise, seals of several kinds, the walrus, and the polar bear; of the fish, salmon and trout only are at present exported, although a very fine species of white fish is found in the Nelson River.

The whale fishing in Hudson's Bay has for many years past been actively prosecuted by citizens of the United States, chiefly from the ports of New Bedford, Mass., and New London, Conn. The voyage is generally made in comparatively small sailing vessels and occupies about eighteen months; leaving their New England port early in June of each year they make the best of their way to Marble Island in the north-west of Hudson's Bay, generally arriving some time in September, and going into winter quarters in the outer harbour there. As many as four ships have wintered together at this place, and the long row of graves on Deadman's Island bears strong but silent testimony to the trials and hardship, that these men undergo in the pursuit of their calling. After spending the winter in harbour here, the ships are sawn out of the ice early in June, and cruise about the Hudsons Bay till the latter part of July or beginning of August, they then go up Rowes' Welcome and generally return leaving the Bay for home early in September.

That the pursuit of the whale fishing has been fairly profitable may be presumed from the fact that the shrewd citizens of New England continue to prosecute it.

In the winter of 1885-86 two vessels belonging to New Bedford, Mass., wintered at Marble Island. This winter 1886-87 two vessels are in the Bay, and I am informed that two more are now fitting for the fishing there to sail from New London early in June.

The following is a table showing the number of ships sent by the New Englanders to Hudson's Bay and Cumberland Gulf, in each year from 1846 to 1876, with their catch :—

TABLE showing number of United States Vessels sent to the Whale Fishery of Hudson's Bay and Cumberland Gulf.

Year.	Number of Ships.	Total Tonnage.	Catch.		
			Sperm.	Whale Oil.	Bone.
			Brls.	Brls.	Lbs.
1846	1	376	.....	140	.....
1847	1	376	.....	1,111	15,000
1849	1	376	.....	600	12,000
1850	1	376	.....	450	7,000
1851	1	376	.....	258	4,900
1853	2	281	.....	1,259	24,000
1855	2	491	.....	184	.....
1856	2	394	.....	606	2,200
1857	2	281	.....	710	12,200
1858	2	526	50	2,163	33,000
1860	10	3,449	50	2,160	126,800
1861	2	853	70	2,795	43,900
1862	5	1,397	38	3,755	64,280
1863	9	2,501	368	4,046	64,150
1864	17	3,896	365	9,146	147,145
1865	5	1,324	37	3,782	62,000
1866	16	2,601	95	5,316	90,800
1867	5	992	10	2,276	32,589
1868	8	1,201	237	2,893	36,395
1869	5	820	220	2,523	36,305
1870	3	509	.....	1,765	27,040
1871	5	1,123	20	443	5,100
1872	3	380	.....	1,058	16,259
1874	3	665	60	1,950	28,000
1875	2	485	.....	630	9,000
	113	.....	1,620	56,019	900,063
Average, 25 years	4 or 5 ships per year.	Average per ship.	14·3	496	7,965

(From Petermann's Mitteilungen explorations of D. F. Boas).

In the period 1846-76 sixteen ships engaged in the trade were lost, but if we take the above catch and consider that the average size of the ships is only 240 tons the margin for profit is still very large.

Looking at these cargoes with the prices obtainable to-day the fishery is a most valuable one.

This average cargo yields to-day :—

2 tons sperm	$ 400 00
62 tons whale oil	6,800 00
3¾ tons bone, say	40,000 00
	$47,220 00

Besides the legitimate pursuit of whales, each one of these ships is an unlicensed trader, competing with the Hudson's Bay Company for the trade with the natives. The Hudson's Bay Company pay the full duty called for by the Canadian Protective Tariff on all the articles imported by them for the trade of Hudson's Bay region.

The duty on the ships invoices for 1885 amounted to twenty-two thousand dollars, paid at York and Moose, thus forming a direct tax on their trade with the natives. It appears unjust that the company should pay this very considerable sum to the Canadian Treasury, and then have to compete against these unlicensed traders, who are exchanging tobacco and occasionally alcohol, from the bonded stores of the New England States, for the furs which would otherwise fall into the hands of the Hudson's Bay people. In order to compete for this traffic the Hudson's Bay Company now send a squadron of boats, up the west coast of Hudson's Bay nearly to Chesterfield Inlet, and they have established regular trysting places, with the natives who each spring bring in their products of musk ox robes, otter skins, blubber, ivory and seal and walrus skins.

But these enterprising whaling captains not content with the trade they can make from their vessels have established regular trading stations on the north shore of Hudson's Straits and in the Frobisher Bay and Cumberland Gulf. At the station in Hudson's Strait the staff consisted of Capt. Nipgin and four other white men—they are the representatives of the well known whaling firm of C. A. Williams & Co., of New London, Conn. They have several complete whale boats thoroughly equipped, and have trained the Eskimo of the district until they have now become quite expert as both oarsmen, harpooneers and boat steerers. Three boats crews of Eskimo are thus employed by Capt. Nipgin; they are stationed at points on the coast some little distance from each other and are thus in a position to follow any whale which may come into the open water, that shows here in the beginning of May, when the ice is driven off the land by the wind. Their watch is kept up all through May, June and July. from the time the ice first begins to open until it has all gone.

For the last three years they have not succeeded in capturing any whales at this station, but the expenses are small, and the capture of a single right whale once in three years, added to the profits which must accrue from the trade done with the Eskimos would make the venture at this station a financial success. The station is visited each year by the relieving vessel called the "Era," though the station hands remain at their posts for two or three years. The "Era" also visits the other stations in Cumberland Gulf, returning to New London in October each year.

The SS. "Arctic," of Dundee, went in this year to fish in Hudson's Bay, and, as stated in the preceding pages, went up Rowes' Welcome to Repulse Bay. One of the Dundee newspapers, of date 5th November, 1886, publishes the results of the year's fishing by the whaling fleet; in it we find the "Arctic" credited with 11,000 seals on first trip, 600 old seals second trip, 2 right whales. The latter yielded no less than two tons of whalebone, and at the end of the article it is stated that sellers were holding out for $12,500 per ton; it will be seen that from whalebone alone the "Arctic's" northern voyage was worth $25,000.

The right whale (*Balaena Mysticetus*) is, in consequence of the high price of whalebone, by far the richest prize which the whaler can capture, and it is unquestionably true that of late years their numbers have been sadly diminished. To such an extent is this the case that no new ships are at present being built for the trade, notwithstanding the fact that four, viz., the "Resolute," the "Jan Mayen," the "Triune" and the "Star" were lost during the season of 1886. The sailing brig-rigged whaler "Catherine," of Peterhead, was also lost last season, and I am thankful to be able to add, that in no one of the above five cases of wreck, was there a single life lost.

Twenty years ago the Dundee fleet used to load regularly in Cumberland Gulf or the southern part of Davis' Straits, but now they have to follow the ice, sometimes going right down through Lancaster Sound into the Gulf of Boothia, and many of them even then return *clean*, or with but partially paying loads. In Hudson's Bay and Straits we only saw two or three whales this year. But several were seen at the

different stations, and it is to be feared that unless some system of protection is adopted this valuable marine mammal may become extinct.

Before concluding this section I would state for your information a few facts in regard to this the most valuable of all marine mammals. In size they vary very greatly, and different individuals yield, irrespective of size or age, the most different amounts of oil and bone. What whalers call a good "pay fish" would run from 50 to 60 feet in length, and the size bone, *i. e*, the central laminae in the mouth must be up to 12 feet in length. Such a one would yield upwards of a ton of bone, and might, according to his condition, give anything from 20 to 40 tons of oil, the blubber varying in thickness in the individual specimens from six to eighteen inches. A fish of this description would, at present prices of oil and bone, be worth about $18,000. The question has frequently been asked me as to what use the whalebone is put which gives it the great value it has. Much of it, especially the long bone, is worked into the better class of silks to stiffen the fabric, and on this account alone, as the demand considerably exceeds the supply, thus keeping the price at its present figure.

The bottle-nose whale is a comparatively small animal, reckoned to average a ton of oil apiece. They are seen in large numbers off the edge of the ice pack, at the mouth of Hudson's Straits in June and July.

The White-whale (Beluga Catodon), is, beyond all question, the whale of the Hudson Bay. On the Churchill River, the York and Nelson Rivers, they go up with the tide each day in great numbers; they were also seen at the stations in the Straits, At Churchill, the Hudson Bay Company prosecute this fishery by means of trap nets as described in former reports. The fishery there was very successful this year, so much so that they had to take the nets up though the whales were still present in great numbers, as they had already filled every available package with oil. The skin of this animal is also valuable, fetching from $7 to $10 each, and as each whale will average about 40 gallons of oil, they are worth from $20 to $25 each. I was much struck when surveying the channel on the Nelson River, by the almost incredible number of these animals which were passing up and down the estuary; they were quite tame, occasionally bobbing up and blowing, within twenty or thirty feet of the boat. The Indians employed by the Company here, drive a row of stakes into the mud at low water, and then sitting on their little platforms, which are built out on the flats by themselves, of four posts and a board, they shoot the whales as they come up, the carcase sinks and taking against the row of stakes is grappled for and buoyed and anchored at low tide. As soon as a load is secured, the large blubber boat is sent round which brings the carcases to the factory, when they are flenched and the blubber tried out, the skins cured, and the carcase put by, for the food of the dog trains in the winter. The use of the rifle as a method of capture is, in my opinion, very wasteful, for many of the carcases are lost or only cast up on the beach, when putrefaction sets in to such an extent as to render it valueless, unless for wolf-bait. I believe that these animals can be profitably hunted and at small cost, at many places in Hudson Bay. One of the whaling captains has told me of their being seen in Frobisher Bay, in thousands, but it would be difficult to imagine them more numerous than I have seen them in the Nelson River.

At Little Whale River the Hudson Bay Company formerly carried on an extensive fishery, but lately, owing, I am informed, to the silting up of the channel, at the mouth of the river, the whales pass by to the northward, without going into the harbour there.

At Ungava (Fort Chimo) large numbers of these animals are also secured, and altogether this fishing cannot be regarded as other than a considerable source of profit to the Hudson Bay Company.

The Unie or narwhal (*Monodon Monoceros*). Very few of these animals were seen in Hudson Straits; they are a good blubber whale for their size, and the horn of the male is valuable as ivory. I have generally seen them in schools of four or five, though the whalers in Davis' Straits report much larger numbers together.

The walrus (*Trichechus Rosmarus*). This animal is found in very considerable

numbers in both Bay and Straits. Its commercial value is high; the skin, when green salted, fetching sometimes as much as twenty cents per pound, and as a fair sized walrus would yield 400 lbs of hide, at say twelve cents per lb., the hide is worth about forty-eight dollars; they also yield from three to five hundred weight of blubber, of second rate quality, as it is full of fibrous tissue, and thus yields proportionally less oil; the ivory tusks are worth about one dollar per pound, selected, and taking all kinds together about seventy-five cents per lb. I estimate that one of these animals of average size will yield between sixty and seventy dollars worth of merchantable products. The Eskimo of Hudson Straits continually attack and kill these animals, though, rarely if ever doing so, single-handed. As a rule, the hunt proceeds as follows:—The quarry, having been observed lying basking in the sun, upon the ice, which is passing by with the tide, the hunters start in pursuit, each in his kayak, armed with lances, harpoons and guns; to each harpoon barb is attached about 30 or 40 feet of stout hide line, to the other end of which is attached the bladder, consisting of the skin of a seal blown full of air; stealthily approaching their prey, the hunters throw their harpoons, and one or two barbs as a rule will get fast, the wounded animal at once takes to the water, but has now to carry down with him as he dives, one or two of these large bladders. Confused and irritated with the pain, he swims hither and thither, sometimes charging his pursuers, who adroitly keep clear, and launch in additional spears or harpoons, only using their guns when they are sure to take effect—almost the only vital spot is about two inches or rather more behind the eye, about the base of the skull, a bullet near this spot administering the *coup de grace*. When the walrus is dead great rejoicing is held in the Eskimo camp, as his capture insures immunity from starvation for some time. The heart of this animal cooked and dressed as an ordinary beef heart was by no means an uncommon dish on the "Alerts" cabin table, and was a welcome change from the routine dishes of salt pork at one end of the table, and salt beef at the other, which, with salt cod on Fridays, formed the staple of our meals.

International agreement, having the force of law, has already, in the case of seals, restricted the season during which they may be taken, and I think it would be eminently wise to continue to legislate still further in this direction for the protection of these their bigger brethren, and also for the cetaceans.

The walrus is never seen far from shore, and in thick weather the sight of two or three walrus (I do not think I have ever seen one by itself) should be warning to run the lead down at once and keep a bright look-out for the land. In a paper on the seals of Greenland by R. Brown, published in the instructions for the Arctic expedition, 1875, by the British Admiralty, the writer, after discussing the geographical distribution of the walrus and pointing out how, by the incessant pursuit of man, they have been driven from the Gulf of St. Lawrence and other southern haunts to the Arctic regions, states as follows: "It is not now found in such numbers as it once was; and no reasonable man who sees the slaughter to which it is subjected in Spitzbergen and elsewhere can doubt that its days are numbered. It has already become extinct where it was once common. Its utter extinction is a foregone conclusion."

Seals.—Nearly all the families of seals seem to be represented in Hudson's Bay and Straits, but they are never reported, either by our observers or the natives, as having been seen in large packs, such as are met with off the Newfoundland coast in the spring of the year. A large number are, however, killed, and they form, for a very considerable portion of the year, the diet of the Eskimo; at all times their skins are their clothing and are also used for covering their kayaks and making tents.

Almost the only way in which these animals could, in the Straits, be made tributary to commerce would be by establishing stations at points on the south side and furnishing the natives with barrels or tanks for storing the blubber and with salt for keeping the skins green. A good deal of both oil and hide could be collected in this way, and if the Eskimos knew that a ship would call regularly for their produce at these stations they would retain all their furs which they now have to carry hundreds of miles to the Hudson's Bay posts at Whale River or Ungava.

The fishes exported from Hudson's Straits and Bay are salmon and salmon-trout. The codfish does not appear to go west beyond the eastern side of Ungava Bay.

The salmon fishery is at present only prosecuted by the Hudson's Bay Company in Ungava Bay. Up to this year, large quantities of salmon caught in the rivers flowing into Ungava Bay have been sent home fresh, in the company's refrigerator steamship "Diana." I am informed that they now find it more profitable to export the salted salmon, and that they have this year done so. I was also informed that it was the intention of the company to extend this branch of their trade. Other rivers flowing into Hudson's Straits at the south side, have large quantities of salmon in them, and for the quality of the fish I can vouch, as I have never tasted finer salmon than those we got freshly killed by the Eskimo at Stupart's Bay.

The Hudson Bay Company are the only people who are at present engaged in the salmon trade, and the following statement shows how difficult it is to break their monopoly. A glance at the chart of Hudson's Straits shows that Ungava Bay forms a deep pocket on the south-east side of the Straits, and, as the current on the south side of the Straits flows east, and in July the prevailing winds are from the northward, we should expect, and our experience shows, that the ice remains in this bay for some time after a channel is clearly open in Hudson Straits; thus, we find the Hudson Bay Company's steamer "Labrador" fast in the ice for some days here in the latter part of August, and the report of the Hudson Bay people, with whom I have discussed this question, is that it is no use trying to get into the bay until the beginning of August at the earliest. Such a condition of affairs shuts out the competition of the Newfoundland schooners, whose hardy crews follow the cod fish to the Ultima Thule of Cape Chidley. One or two schooners have passed through the Button Passage, south of Cape Chidley, into the Bay, and have got a few salmon, but none have ever got a paying load, because they cannot get in early enough in the season.

Trade.—The trade of Hudson's Bay and Straits region should be called barter, for it consists in the direct exchange of commodities; in considering the value of this trade, the temper and character of the natives is a most important element. I cannot enter at all into the particulars of the fur trade, the secrets of which nothing short of a railway will lay open; my experience with Hudson's Bay officials being that no matter how talkative, hospitable, or genial the official may be, the question, for instance, of whether otters were getting scarce, always elicits the same reply, Oh! very scarce, very scarce indeed; there is no profit at this post, it is kept up for the Indians. I have never met an official who admitted that his post was run at a profit to the company; so one must, taking them at their words, believe that the company is a huge philanthropic and patriotic institution, contributing upwards of $20,000 a year to the Canadian Government, for the privilege of feeding the non-treaty Indians of Hudson's Bay. Of the character of the Indians, I can say nothing from my own personal experience with them, but of the Eskimo, especially of those who have had but little intercourse with their white brethren, I have the highest opinion, both of their capabilities for development and of the natural goodness of their dispositions. Whilst perfectly fearless in the chase, they are not quarrelsome with each other. There are, of course, bad characters, such as thieves, and sulky, lazy men among them, but the great majority are a docile, friendly people, gratified immensely by a word of kindness, but sufficiently like their white brethren in mental calibre to appreciate the word, more highly, when accompanied by its tangible companion, the gift, which in this case generally takes the form of a clay pipe or the half of a small plug of tobacco. I have always found them willing to work and the best proof of their usefulness is in the fact that the Williams' Company have, as already stated, three organized whale boats crews, who go every spring to the station and fish during the season. From all the information I can gather I do not think that the number of these people in the Hudson's Straits region can exceed 1,500 of all ages and sexes, but this estimate is but little more than a guess, for their system of counting which generally runs one, two, three, a great many, makes it difficult to get from them any idea of the numbers of other bands. They seem to suffer considerably

from lung diseases, the amount of coughing, which I heard once in a group of these poor people, struck me quite painfully as but the natural result of the hardship of their lives. They are very chary of speaking of their religious superstitions or beliefs, and I have myself never being able to obtain their confidence. Mr. Tyrell, who was the observer at North Bluff during 1885-86, learned to speak their language with considerable fluency, and some of them discussed with him their religious beliefs; he tells me that they believe in a future state and in a good Spirit, but also in a great many evil ones. They have also superstitions in regard to the killing of certain animals which occasionally interferes with their work. Mr. Payne, at Stupart's Bay, found that after killing a walrus few of them would do anything for three days. There is no question in my mind but that the trade with these Eskimo can be greatly developed by the establishment of stations at certain points and by letting them know for certain that a vessel would call each year and give them goods for their pelts.

At present the entire trade of the region, over which Canada has jurisdiction, is in the hands of the Hudson's Bay Company and the American whaling companies.

The right of Canada to regulate the fishing and trade of Hudson's Bay and Straits, is, I think, unquestioned, and it seems somewhat one-sided, considering our relations with United States fishermen, that we should continue to allow them to frequent the Bay and compete with foreign duty-free goods against the Company which pays heavy duties to our Treasury on all the articles imported for their trade.

It should be further insisted on, that we have the right to regulate the method to be pursued in the capture of the whales, and to exclude the explosive bomb lance from the list of weapons which may be used.

Experience shows that whales are timid and rapidly desert good breeding grounds when much hunted. They, like the walrus, have been driven from the Gulf of St. Lawrence, and are year by year becoming reduced in numbers and driven farther into the ice-bound refuges of the Arctic Archipelago. The Gulf of Boothia is now their last home and it is rendered comparatively safe, from the difficulties and dangers attendant on a voyage. Captain Guy, of the "Arctic," had intended going from the Rowes' Welcome to Fox Channel and thence to the Gulf of Boothia, but found the Frozen Straits (Middleton), solidly iced in, all summer, and hence it may be said that it would be difficult in the extreme, if not impossible, for a ship to pass from Hudson's Bay and Fox Channel to the Gulf of Boothia; but though there be no means of communication for steam vessels there is no difficulty in the way of the whale, whose powers of subaquatic existence are great, passing from the one place to the other.

I am of opinion that the right whale is being hunted out of Hudson's Bay as he has been from his other southern haunts, and that, not by our own people, or by the fellow subjects of the British Crown, but by the citizens of a foreign though neighbouring State.

It is also worthy of remark that up to this time no Canadian has derived any profit from the development of the resources of Hudson's Bay, save those few who may happen to be shareholders in the Honourable Hudson's Bay Company.

In a previous report I drew attention to the fact that the Colony of Newfoundland collects the duty on articles consumed in that portion of Labrabor subject to the Dominion of Canada. Fort Chimo is clearly within the limits of the Dominion and is the distributing point for some other stations, yet the duty on the whole of the supply ship's invoice, is collected by the Newfoundland Government, the Company deriving the benefit of the difference, between the Newfoundland tariff and our own.

I would respectfully submit the following suggestions in reference to the matter of the trade and fisheries of the Hudson's Bay and Straits region :—

First. That you should consider whether, in view of the value of the whale fishery, and its present condition in Hudson's Bay, it would not be well to close altogether for a stated time, say five years, the whale fishing in these, the terrritorial waters of Canada.

Second. That if foreigners are to be permitted to prosecute the whale fishery and to trade with the natives, a heavy license should be charged for the privilege, and the use of explosive bomb lances prohibited.

Third. That, as in other parts of Canada, a rental should be charged for the the exclusive use of salmon river.

Fourth. That the duties which I am informed are now collected by the Newfoundland Government on goods for consumption in Canada should be paid over to the Canadian Government.

Fifth. That any station established at points on this Strait for purpose of trade &c., should be compelled to pay full duties as *called for under the Tariff.*

If these suggestions are carried out the revenue derivable would, I am sure, go a long way towards paying the costs of maintaining a Government vessel in these waters during the season.

I have dwelt somewhat fully upon the fishery and trade resources of this region, because I am convinced that properly managed they will, irrespective of the question of the development by railway communication, be a source of wealth to our citizens.

Of the mineral resources, Dr. Bell, of the Geological Survey, has already fully dealt; he also contributes a chapter to this report, somewhat further elucidating the subject.

Samples of some economic minerals were brought in at some of the stations by the Eskimo; at Ash Inlet, fine white mica in fairly large sized sheets and pure foliated graphite were brought in. I would also draw attention to Dr. Bell's strongly expressed opinion that judging from the information we have already obtained, he regards the north-west of Hudson's Bay as one of the most promising in valuable economic minerals of the yet unexplored Territories.

METEOROLOGICAL OBSERVATIONS.

The scheme of meteorological observations for the stations in Hudson's Straits has been continued unchanged, all the instruments used were such as are issued to stations in connection with our Dominion Meteorological Service. The station at Nachvak Bay (Skynner's Cove) having been discontinued, the observations taken at Fort Chimo to a certain extent take the place of those formerly taken by Mr. Skynner. At York Factory we have through some incomprehensible miscarriage of the mails, from that post, lost for the second time the observations from that point.

In the observations as published with this report all the instrumental corrections have been applied and the corrected readings of the barometer have been reduced to sea level.

The exposure of the anemometers are all inferior and I am of opinion that the actual velocities out in the Straits would, on the average, be fully twenty-five per cent. greater than those here recorded.

The thermometers, at all the stations in the Straits, were exposed in the regulation Meteorological Service shelter. This consists of an outer shed or case having Louvre sides and door, and a double roof, with an air space open at the sides. The bottom of the shed is of large mesh (2 in.) wire net, and the back of close half inch board.

The inner screen is covered on all sides with thin slats of sheet iron. The whole shelter is attached to the north side of a close board double fence, having a free air space of four inches between the two sides of the fence and also between the north side of the fence and the back of the outer shed. This form of shelter, when the fence to which it is attached is erected in some open space clear of surrounding objects, is as nearly a perfect exposure as is obtainable, but in Hudson's Straits on many occasions the readings of the thermometer were affected more or less by the sheds being drifted full of snow.

Table I is a general table for the station at Belle Isle Island Lighthouse. Observer, Mr. Colton. This is one of the regular stations in connection with the Meteorological Service of the Dominion, and the observations were taken at 3h., 7h., 11h. of the standard time of the 75th meridian. Correct time is obtained from a sun dial, of the pattern constructed by this office for outlying stations, which was adjusted by Mr. Stupart, Inspector of the Meteorological Service, when the station was last visited in 1883.

In the series of observations there are a few breaks of short duration—3 days in October, 1885; 1 day in April, 1886; 4 days in May; 2 in July, and 7 days in August; and though it is much to be regretted that these have occured, I do not consider that the value of the series has been greatly affected.

A comparison of this table, with the results of last year shows that the mean temperature of the year has remained practically unchanged, although the distribution in the months has been considerably altered. The increased amount of stormy weather in the season 1885-86 is shown by the increased average velocity of the wind, the increased cloudiness, and additional rainfall. The number of days of fog has also risen from 113 to 136, the latter number being average also of the twelve years observations—1872-83. The fogs of this region have long been noted, but it is a formidable indictment against this channel to state that on the average of twelve years, in the months of June, July, August and September the foggy weather is one-half of the whole.

Table II gives the abstract of results of observations taken at Port Burwell. The observations at this and all the other stations consist of a series of six observations per day, taken at equal intervals of four hours each, the observation hours being 3h., 7h., 11h., a.m. and p.m., of the standard time of the 75th meridian. This station is in latitude 60° 24′ and longitude 64° 46′ W., approximate. The height of the barometer above mean sea level was 30 feet. The site of the thermometer shed at this station was about 40 feet east of the house, and about the same distance from the edge of the cliff; to the south west of this was a small hill, 26 feet high, and about 60 feet off. The height of the ground at the thermometer shed above mean sea level was 27 feet. The hill to the South West cut off a good deal of sun, especially during the winter months. The anemometer exposure was poor between north west and south west, and from the other points of the compass only fair. Notwithstanding this, velocities of 80 miles per hour were occasionally recorded; and both Messrs. Burwell and Shaw, in their remarks, speak of the almost hurricane violence to which the wind sometimes attained.

Table III is the abstract of observations at Ashe Inlet.—J. W. Tyrell, D.L.S., observer. This station is situated on the shores of an inlet of the strait, and is on the large island, which lies to the south of what has been called on the charts, North Bay, but which is in reality the "White Straits" of the early navigators. This island was called by Schswatka "Turenne Island," but is known among the natives as "Big Island." The exposure of all the instruments was similar to that described above, but the anemometer was considerably sheltered from east and north-east winds. Approximate position of the station, latitude, 62° 33′ N., longitude, 70° 35′ W.

Table IV. Abstract of observations taken by Mr. F. F. Payne, of the Meteorological Service. This station is situated near the north-west angle of Prince of Wales, Sound. The Sound itself is a deep bay, about 30 miles across by about 20 miles deep, with numerous outlying shoals in line of the coast, but good deep water inside. The approximate position of the observatory was latitude 61° 35′ N., longitude 71° 32′ W. The station, being at the head of Stupart's Bay, was somewhat sheltered from north winds; otherwise the exposure was good.

Table V. Abstract of observations at Port de Boucherville, Nottingham Island. Observer, Mr. John McKenzie, C.E. The barometric observations here, are from a very good Casella aneroid, which was compared with the standard and found to have a scarcely perceptible temperature correction; the index correction has been applied, and the reading reduced to sea-level. The anemometer was somewhat poorly exposed, being sheltered, from north-east to north-west, by the rocks which rose almost

perpendicularly behind the house. The approximate position of this station is latitude 65° 12' N., longitude 77° 28' W.

Table VI. Results at Port Laperriére. Mr. P. C. Woodworth, observer. This station is on the Outer Digges Island, near the west end of which we found an excellent harbour, on the shores of which the station was erected. This station commanded a view of both Bay and Straits. The exposure for the instrument was good, though the anemometer was considerably sheltered from S.E. to N.E. winds; but this was, all things considered, one of the best exposures we had. This station is in latitude 62° 34' N., longitude 78° 1' W., approximately.

Table VII is the abstract of results from Churchill. The observer here is Mr. John Spencer, the factor of the Hudson Bay Company, at whose residence the meteorological observations are taken. The thermometers are exposed on the north wall of the house, and read through a small window. There is no fire or heating apparatus of any kind near the room in which this window is, and the doors of the shed were opened by means of cords without opening the window. This exposure was the best attainable; and as the thermometers were read without opening the window, and were constantly screened from direct radiation by the doors of the shed being kept closed, I think the mean temperature may be regarded as approximately correct.

Table VIII gives the average daily temperature as determined from observations taken at 7 a.m. and 8 p.m. of local time, at Fort Chimo, the Hudson Bay port on the Koksoak River, near the head of Ungava Bay. Owing to the nature of his other duties, the observer, who is an officer of the Hudson Bay Company, was not able to undertake the regular tri-daily series; but as observations were frequently taken at 2 or 3 p.m., advantage has been taken of them to obtain the highest temperatures, though they were, of course, disregarded in obtaining the means. In high northern latitudes, during the winter months, the daily curve of temperature almost vanishes, the changes seeming to be dependent on the movements of barometric areas and the consequent direction of winds.

These temperature observations seem to indicate the probability of the existence here of winds similar to the Fohn or Chinook winds; the mountains lying immediately to the eastward rise up in an almost unbroken chain to heights of from 4,000 to 6,000 feet, extending from Cape Chidley to Cape Mugford; over these the east and south-east winds have to rise, and, discharging their moisture in the shape of snow on the eastern face of the range, are warmed again in their descent to the level of the sea on the shores of Ungava Bay.

Table IX gives the results of observations taken at York Factory for a long period of years. These results are the mean monthly, quarterly and annual temperatures during 23 complete years. This table gives a very approximate idea of the amount of fluctuation in temperature which is likely to occur in the individual seasons, though in each of the first two tables, the mean temperatures being derived from the 8, 2 and 8 series, are considerably above the true mean of the 24 hours. I have, therefore, entered also the mean 8 a.m. and 8 p.m.

Table X is the mean monthly temperature at 8 a.m., local mean time, from the series 1842 to 1854.

Table XI is the mean monthly temperature at 2 p.m., and may be regarded, except in the months of June, July and August, as nearly equal to the mean maximum reading. Period, 1842 to 1854.

Table XII is the mean monthly temperature at 8 p.m. Same series of observations as two preceding tables.

Table XIII is the average deviation from mean without regard to sign, between the mean temperature of each month and year and the monthly and annual averages of each group, as given in the preceding tables.

Table XIV shows the highest temperature in each month and year from observations made in the several groups of years. In the first two groups the entries are taken from the readings of the ordinary thermometer; in the last period a good maximum thermometer was used, and the readings of this instrument are entered.

Table XV gives the lowest temperatures, in each month and year, taken from observations made in the several groups of years. In the first two the results are taken from the recorded readings of the ordinary thermometer, at the hours of observation; in the last group the readings of a minimum thermometer have been taken.

Tables XVI to XX give the results of the observations of the velocity and direction of the wind at each of the stations in Hudson Straits, the number of observations in each month from each of the sixteen points, and the average velocity of all the winds from each point in each month and in the year.

Table XXI gives the number of days in each month at each station when the velocity of the wind equalled a moderate gale (30 miles an hour) or exceeded this amount.

Table XXII gives the number of hours' fog reported at Belle Isle Lighthouse, at the Hudson Straits Stations, and at Fort Churchill; this table, shows for July and August the following comparison:—Belle Isle has 472 hours, or nearly 20 days, of fog; as against this, Digge's Island, near the warmer waters of the Bay, has 396 hours, whilst Nottingham Island, only 30 miles farther north, has in the same period only 136 hours. The stations Ashe Inlet and Stupart's Bay give one 180 hours and the other 187 hours respectively, the amount again increasing, as the eastern end of the Straits is reached, to 240 hours at Port Burwell.

Table XXIII shows number of hours' snow at the several stations named.

Table XXIV gives the highest, lowest and mean temperatures taken on board H.M.S. "Fury," under the command of Capt. Sir E. Parry, in 1821, 1822 and 1823. Both winters were spent near the head of Fox Channel, though the stations do not fall within the limits of the Temperature Charts which accompany this report.

Table XXV is a weekly abstract of observations taken on board the "Alert" in the cruise of 1886—the means are obtained from a bi-hourly series of observations; the maximum and minimum being taken, from the highest and lowest readings of the ordinary thermometer, recorded. The instruments used were, an aneroid barometer by Casella, which had been carefully compared with an Adies' marine barometer, B. T. Pattern, the error of which had been carefully determined; the observations have been corrected for instrumental error and reduced to sea level. The temperature was obtained from a Sling psychrometer, made in the Meteorological Office. It consisted of two thermometers—Negretti and Zambra—Kew tested, fastened on a walnut wood frame, with an aperture cut in the head of it to fit the hand. The bulb of the wet thermometer projected about two inches below that of the dry, and both were protected from accident by a light strip of metal being carried in the form of a bow beyond the bulbs.

Table XXVI gives the mean daily temperatures of the sea surface from a bi-hourly series of observations.

The following is Mr. Payne's report on the "Flora" and "Fauna," observed at his station:—

FLORA AND FAUNA OF PRINCE OF WALES SOUND, HUDSON STRAITS.

F. F. Payne.

During a stay of thirteen months at Prince of Wales' Sound, Hudson Strait, with the primary object of taking meteorological observations, and having some leisure time, I devoted as much of this time as was possible to the study of the natural history of this region, making collections of the mammals, birds, fishes, insects and plants; also, making numerous notes from my own observations, and from such information as I could gather from the Eskimo, who are most keen observers of nature.

So much has been written descriptive of the habits of the mammals and birds found in these regions by those who accompanied the expeditions of Drs. Hayes and

Kane, and by other able writers, that it would be almost useless to go over the same ground again; I shall now, therefore, only dwell briefly on such other items of interest as came under my personal observation and knowledge, giving the dates of migrations, &c., of each species in the order in which they stand.

MAMMALIA.

Polar Bear (*Ursus Maritimus, Linn*) (*Nannook, Eskimo*).

The polar bear, though numerous 200 miles to the westward, is scarce in Prince of Wales' Sound; and although a sharp lookout was kept for them, only four were seen, one of which was shot.

The Eskimo informed me it was useless to look for them during the winter, as they were never seen until June, when the ice is breaking up. They are then occasionally taken on the ice-floes, as they drift to the eastward with a regular current that sets this way, which is of great assistance to the bear in its migrations.

At this season the seals, on which the bear mainly subsists, are very numerous, and are captured while they sleep, the bear creeping to within a short distance, and then running at full speed upon them.

Though almost a marine animal, the bear occasionally visits the land, where it regales itself on the young grasses, the eggs of the gull and duck, and has been seen capturing salmon and trout by driving them into a corner in shallow streams.

On the whole, I do not think it is as fierce as it is generally supposed to be, for although many enquiries were made of the Eskimo as to this, they could not recall a single instance of its having attacked any of their people; nevertheless, it is feared by the women, who were careful not to be alone at the time several were seen, and all of them expressed fear of it.

Wolf (*Canis Lupus Occidentalis*) (*Armarho, Esk.*)

Little can be said of this animal, as none were seen during my stay here; and I was informed by the Eskimo they were now seldom taken, though at one time very numerous.

They are very troublesome to the Eskimo, often tearing their seal-skin boats or kayaks in pieces and devouring the skin, which they relish very much.

Their food is very varied, and their appetite is so great there are few animals they will not attack and devour; even the Eskimo dog is occasionally carried off.

Their fur is very much valued by the Eskimo for clothing, but as a rule goes to the trader for powder, lead and tobacco.

Wolverine (*Gulo Luscus*) (*Kubvie, Esk.*)

This is the Eskino's greatest enemy, and should one appear at any time near their camps they will not rest until it has been killed; and when one is brought in there is great rejoicing. It is the most ingenious thief of all the animals in this region, and is so strong that no cache is safe where it exists. It will turn heavy stones over, and once in the cache it does not stop to untie the well-made skin-bag, but soon tears a hole, and, Eskimo fashion, lives on oil and blubber until the bag is emptied, when it turns its attention to the next cache.

The thieving propensities of this animal are so like that of a dishonest human being, that an Eskimo who is known to be a thief is always called a "Kubvie" by his people.

Fortunately this animal is not numerous in the Sound, though they are often trapped a few miles to the westward, where they, like the wolf, are seen throughout the year.

Arctic Fox (Vulpes lagopus, L.) (Ter i-in-i-ak, Esk.)

There are two varieties of this animal common in these regions—the blue and the white—the habits of which, with a few exceptions, are so like that of the red, black and silver gray foxes, all of which were seen, that it will only be necessary to speak of them as a single species.

In the early part of September, the white fox began to appear in large numbers upon the coast, and shortly afterwards those of other colours, which are much rarer, were reported as having been seen.

At this time the fur of all the foxes is very short, and that of the Arctic fox is or the most part of slatish colour, though in some instances almost white, with a ew scattered black-tipped hairs.

Spring traps were kept set throughout the winter, and a number of red and white foxes were taken, by which means we were enabled to note the changes in the colour of the fur.

Late in November the fur was still very grey, especially near the roots of the hair, and showed little change a month later. During January, the fur appeared to grow very fast, and by the middle of that month was perfectly white, with the exception of small tufts of the old hair, which, in a great many instances, remained entangled in the new throughout the winter. It was also generally noted that the largest and best conditioned foxes had the best fur.

During the winter the fox depends almost entirely upon the lemming (*myodes torquatus*) for subsistence; but during the seal-breeding season it may often be seen roaming over the ice in search of the young seal, and when very hungry will attack the older ones.

On visiting the traps one day, it was found that a fox had been caught, but had by some means gone off with the trap. As it was supposed it could not go far, it was tracked in the snow; but after walking five miles the attempt to come up with it was given up. Three weeks later this fox was sighted a few hundred yards from the observatory, and was given chase by an Eskimo, who soon captured it, when the jaws of the trap were found to be deeply imbedded in the leg.

Unlike the red fox, the white fox, when caught, will howl most piteously as it is approached by the trapper, and upon going up to it, it immediately stands on the defensive, and will fight most fiercely for its life.

After 1st February foxes became very scarce, and few were taken, the last being seen on 10th May. A few remain on the coast throughout the year, but nearly all migrate to the interior, where they can enjoy the luxuries of young ptarmigan and other birds, besides the pleasures of scratching their backs upon small bushes when undergoing the difficult process of change of clothing.

Eskimo Dog (Canis Familiaris, Linn) (Kingmik. Esk).

The Eskimo dog so nearly resembles the wolf (*Canis Lupus Occidentalis*), it is difficult to describe it as other than that animal, excepting when in harness and under the lash of its master's whip.

When at liberty it may often be seen roaming over the country in search of the lemming or other food, and appears only to care for its master for the food it may get from him.

There is only one redeeming quality in its habits, and that is its simple appetite; it will live a great length of time without food, and is not at all particular what it eats, as the following list of articles which I have seen it devour will show:—An old cloth hat, a boot, part of a flannel shirt, part of a pair of trousers, without the buttons, and a lot of greasy felt gun wads, which were seen the next day carefully placed beside a stone undigested. It may be added, *en passant*, these gun wads were subsequently used by an Eskimo for his gun.

As might be supposed, the dogs do not grow very fat; nevertheless, they are often slaughtered for food during hard times, and their skins are made into clothing.

In harness the Eskimo dog appears as a different animal. It is then fed occasionally upon the skin of the walrus and other refuse; but woe betide the dog that refuses to pay for this food by pulling too lightly upon the load that is given it; thrashing is then too good for it, it must pay with a part of its body; and carelessly going up to it, the quiet though enraged Eskimo will take his knife and cut a small piece off its tail or ear, and will as coolly return to the sleigh with the call, "Whoots!" which means, get on.

Having a large Newfoundland dog with me, which was brought up on the ship from the Labrador coast, it was very interesting to watch its treatment of and by its Eskimo neighbours. From first to last the males were deadly enemies, my Newfoundlander disdaining to have anything to do with them, but with the females he was a particular favourite, thereby causing some most terrible rows in the camp.

Reindeer, Rangifer Tarandus (Linn, Baird) (Took-too, Esk.)

The reindeer is only a summer visitor to the coast, arriving in the early part of April, and leaving again for the interior in November.

The horns of those taken about 10th April were soft, and a great many were covered with velvet.

At this time of the year, a great stir is noticed among the Eskimo, and in a few days all leave for the hunting grounds, a few miles inland, where the deer are most plentiful, returning to the shore again about six weeks later.

The reindeer is undoubtedly the most useful animal to the Eskimo that is found in these regions, its hide being used for clothing and bedding, its horns for spear and arrow heads, and the lining of its belly for sewing thread, while the fat, which is usually melted down, is one of the greatest luxuries the Eskimo possess.

In June the young are dropped, and during this month and July the deer is not molested, as the Eskimo is then too busily engaged in seal hunting. In August the hunt again commences; and at this time the Eskimo secures all the skins he can for winter use; unfortunately, however, owing no doubt to the large number that are killed annually for their tongues, which are shipped to the London market, they are not so numerous as formerly, and many a poor Eskimo has to make shift with a few thin skins for his bed, and the same for his clothing, throughout the winter.

While exploring one day a natural deer-trap was found, in the shape of a wide crevice in the side of a hill that had, doubtless, been formed by the action of frost. The sides were perpendicular and about twelve feet high; and in it were the skeletons of several deer, and one that had recently fallen in.

Polar Hare (Lepus Glacialis, Leach) (Ookaluk, Esk.)

Like other varieties of the same species, the polar hare is a most timid animal, and is so watchful of its enemies that it can seldom be seen to any advantage, and is only shot as it passes like a ball of snow in its swift retreat; nevertheless a few fine specimens were taken and added to my collection.

Although it undoubtedly remains here throughout the year, none were seen until the month of December; and from that time until the end of May in the following year, its well-known tracks could be seen in the snow in every direction. Its food consists of a number of small plants, especially the knotty roots of certain grasses which it obtains by burrowing in the snow and moss.

Hudson's Bay Lemming (Myodes Torquatus Pallas—Mus Hudsonius, Forster) (Avingnuk Esk.)

This is the smallest of the quadrupeds found in these regions, and apparently only inhabits the coast, where it is so numerous, that by turning over a few stones, one or more are sure to be found.

On a still winter's night, when everything appears hushed in sleep, this interesting little animal may be heard in every direction, boring through the snow; every now and then stopping as if to take breath, and again returning to its labours. Then is the time its enemy (the fox) stands and listens, and then pouncing upon the spot where the boring is heard, cuts off its retreat, and, with little trouble, secures its prey.

The fur of the lemming is of a greyish colour in the summer time, gradually turning whiter as the winter approaches, but never becoming perfectly so. In some cases the skin was found perfectly hairless in parts that had been affected by a parasite, which infests this animal.

Walrus (*Trichechus Rosmarus, Linn*) (*Iviuk, Esk.*)

The walrus is not numerous at any time in the Sound, and disappears altogether in July, not returning again until about the middle of November; it is then eagerly looked for by the Eskimo, who may be seen exploring the ice from a neighbouring hill with their telescopes, and occasionally walking out to the open water when one is sighted.

During my stay here very few of these animals were seen, and of those taken only one was an adult specimen, the others all being very young.

The tusks of the walrus are of great value to the Eskimo for spear heads, and for many other purposes, the ivory often being sawn into lengths and used in shoeing their sleighs.

Great Seal (*Phoca Barbata, O. Fab.*) (*Oog jook Esk.*)

This is the largest of all the seals found in these waters, and next to the deer, it is perhaps the most valuable animal to the Eskimo.

It arrives in the Sound soon after the ice has broken up, about the end of June, and although never very numerous, they are taken from that time until the Strait again fills with ice towards the end of October.

In common with other seals, they are shot or harpooned either while they sleep on the ice or while swimming in the open water.

The Eskimo say the great seal has never been known to breed here, and all those taken during my stay must have been over five months old.

The skin of this seal is used in making kayaks or boats, and harpoon lines of great length are made from it by cutting the skin in a narrow strip round the body as you would peel an apple. It is also used for the soles of boots, the hair being first scraped off and the skin then dried in the sun, and afterwards going through a process of chewing by the female Eskimo.

Harp Seal (*Phoca Grœnlandica*) (*Kyro-lik, Esk.*)

The harp seal, so named from a distinct harp shaped mark upon its back, arrives in the Sound a little later than the great seal, and is much more numerous, leaving again as soon as the ice approaches in October. It does not often take to the ice, but may be seen swimming a short distance from land, and is seldom alone, there almost invariably being several together.

With the exception of one or two, all those taken were adult seals, the youngest being about four months old.

The skin of this seal which is very large, is used in making wigwams, and for the upper parts of Eskimo boats.

Rough Seal (*Phoca Fœtida, Fab.*) (*Natchuk. Esk.*)

This is the most numerous of all the seals found in these waters, and constitutes the principal part of the Eskimo's food. It remains here throughout the year, but is scarce during the months of February, March and April.

The first young seal taken was on 5th March, and about this time several more were seen. They are born on the ice where the snow is deep, the parent seal making a most comfortable house under the snow. These houses are not easily found and are only detected by a small mound slightly above the level of the snow.

It is often wondered how the seal may be seen to appear on the ice where only a short time before not a hole could be seen, and some writers on the subject have declared the seal makes a hole from the under side of the ice by keeping its warm nose pressed against it. This appears so absurd, that during my stay here a careful examination was made of all the seal holes that were seen, and in every instance they were found along the line of wide cracks that are constantly being formed by the ever-changing tides. As will be readily understood, the water between these cracks soon freezes and becomes covered with snow and the seal keeps a hole open by constantly diving and returning again to breathe, until, by the accumulation of ice caused by the seal splashing, the hole becomes too small when it again shifts its position to the nearest crack in the ice.

Many are the arts the Eskimo resorts to capture this seal and perhaps the best is by two hunters, one of whom lies down at the edge of the ice near some open water, while his companion remains about ninety yards further from the edge. Here he scrapes upon the ice with his spear and whistles in a low note whilst the charmed seal, if there is one anywhere near, slowly swims towards the object at the edge of the ice, and when near enough is surprised with a charge of shot, a bullet, or a spear.

Right Whale (Balæna Mysticetus Linn.)

Only two of these whales were seen and as the Eskimo seldom meddle with them, little could be learned of their habits.

They apparently only pass here on their way to or from Hudson Bay, and will not attempt to make the passage while there is much ice in the strait.

Portions of what undoubtedly were the skeletons of three of these animals were found on the shore, and the Eskimo informed me that at one time when there were more of their people living here, they would not hesitate to surround one of these huge monsters in their kayaks and with harpoon and floats would sometimes succeed in killing one.

Narwhal (Monodon Monoceros, Linn.) (Uylung-war, Esk)

Commonly known as the unicorn. The narwhal is often met with in the Strait, and is much valued for its large ivory tusk, which often measures five feet in length. Only one of these animals was seen late in the summer, and the remains of another was found on the shore, the tusk of which measured four and a half feet.

White Whale (Beluga Catodon, Gray), (Kelleluak, Esk.)

The white whale, though indigenous to the Strait, does not come near the coast until the ice begins to open, the first seen being on 26th April, when there was some open water about five miles from the shore. From this time they were often seen throughout the summer, sometimes singly, but oftener in small schools following the line of the coast. Then the Eskimo may be seen standing motionless at some prominent point, with gun ready, waiting patiently for a shot. To one accustomed to extremely quick shooting, a white whale might seem an easy mark to hit, but with the unexperienced, to make the best of it, the bullet never seems to strike anything else than the place where the whale's head was.

During the summer this animal forms a large part of the Eskimo's food and is eagerly hunted by them.

Birds.

Stone Chat (Saxicola œnanthe, L.).

This is, perhaps, the most valuable zoological specimen that was taken during my stay in the Strait. It was the only one seen, and is described by Mr. Whiteaves, Palæontologist of the Geological and Natural History Survey of Canada, who identified all the birds in my collection, as being an "adult male of a European species not previously recorded as occurring in Canada, though found in Greenland.

This active little bird was shot, after a long chase, on 19th May.

Shore Lark (Eremophila Alpestris, Forster).

Arrived 17th May; mating 1st June; young fledged 15th July; was last seen on 10th August.

This bird was very numerous during the summer.

Water Thrush (Siurus nœvius, Bodd).

Arrived 20th May; mating 1st June; young fledged 25th July. Last seen on 1st October. A great number of these birds were seen.

Lapland Longspur: Lapland Bunting (Plectrophanes Laponicus, L)

Arrived 14th May. This was the only specimen seen and taken.

Snow Bunting (Plectrophanes nivalis) (Copenoir, Esk).

The first snow bunting seen was on 1st April, and shortly afterwards they were very numerous. They were mating about 25th May. Young were fledged about 16th July, and about 23rd August the adult birds appeared to leave, returning again a month later, and by 21st October all had disappeared.

Raven (Corvus Corax, L.) (Tooloouk, Esk).

The raven is indigenous to the country, and although most of them appear to migrate southward, a few were seen throughout the winter. They were mating about 25th May, and young were fledged 15th July.

This bird is the Eskimo's companion, following him everywhere in his hunts, and when a seal is shot will perch only a few yards from him and "caw" most vociferously.

They do not seem to understand the mechanism of a fox-trap, and are often caught in the act of taking the bait.

Gyr Falcon (Falco sacer, Forster).

Arrived 6th September. They were not often seen until about 15th September, when a number were observed apparently flying south. The last seen was on 20th September.

Rough-legged Buzzard (Archibutes lagopus, Brunnick).

Arrived on 15th May. Were rather numerous throughout the summer. Fledglings seen on 20th August. Last seen on 30th September.

Snowy Owl (Myctea Scandiaca) (Ook-pi, Esk.).

Only two of these birds were seen in September, neither of which were taken.

Rock Ptarmigan (*Lagopus rupestris, Gmelin*).

Arrived 11th May, mating 30th June, when they were very numerous. Young fledged 18th August, and last seen on 30th October.

Ring-necked Plover (*Œgialitis semipalmatus, Bon.*)

First seen on 1st June; mating, 10th June; young fledged, 12th July; last seen 25th September. These birds were very numerous throughout the summer. One was seen to pick up its young and fly some distance with it.

Red Phalarope (*Phalaropus fulicarius, L.*)

First seen on 31st May. Several of these birds were brought to me during the month of June, but after 1st July none were to be seen.

Purple Sandpiper (*Tringa maritimi, Brunn.*)

Only one of these birds was seen and shot on 27th May.

White-rumped Sandpiper (*Bonapartes Sandpiper, Tringa Bonapartii, Schlegel.*)

None of these birds were found breeding, but a few were seen after 1st July, and about 10th August, very large flocks arrived, remaining until 20th September, when the last of them were seen.

Brant Goose (*Bernicla Brenta, Stephens.*)

The Brant Goose does not breed here. A few were seen in company with Hutchin's goose in their flight southward on Septrmber 15th, and one was brought to me by an Eskimo on December 1st.

Hutchin's Goose (*Bernicla Hutchinsi, Richardson.*)

This bird, in company with the Brant and Snowy Goose, arrived in great numbers on September 6th, and remained here five days, all disappearing when the wind shifted to the southward.

Snowy Goose (*Chen Hyperboreus.*)

Thousands of these birds, in company with those just named, arrived here during a gale on 6th September, and were so tame that seventy were shot in a few hours with very little trouble. They remained here five days, when a steady breeze springing up from the southward, they all disappeared within a few hours, and none were seen after 12th September.

Long-tailed Duck (*Harelda Glacialis, L.*)

The first of these birds seen was on 1st June, and the first fledglings found was on 31st of August.

This is one of the most numerous and certainly the most noisy duck that visits these regions; its long drawn note of "ar-ar-ow-oo" may be heard in every direction.

Its eggs were found on the margin of ponds, from which small streams ran to the sea, and through these the parent bird was seen to conduct her brood when about ten days old.

The last of these birds seen was on 10th November.

Harlequin Duck (Histrionicus Torquatus L.)

The harlequin duck was most numerous during the month of June, but after the end of that month none were to be seen. Apparently this bird does not breed here.

King Eider (Somateria Spectabilis, Leach.)

Large flocks of these birds arrived about 5th May, almost darkening a small piece of water about five miles from the shore, About 1st June, pairs were seen to visit small lakes inland, where, as soon as the ice had melted round their shores, the eggs of this bird were found in nests of down on small mossy islands.

The King Eider lays from four to six eggs, and in some instances continued to lay in the same nests after they had been robbed of the first two or three eggs.

Two nests with eggs of this bird were found several hundred yards from the water, upon a high ledge of rock, from which it would be impossible for a young bird to descend without assistance.

The first young seen was on 25th August, and, like the long-tailed duck, the parent bird in a few days conducts her brood to the sea.

The last of these birds seen was on 30th November.

Herring Gull (Larus Argentatus, Brunnick), (Nowia, Esk.)

First seen on 20th April; was mating 1st June; young were fledged on 12th August. Last was seen on 15th November.

This bird is very numerous throughout the summer, and its nests and eggs were found beside those of the King Eider, on small mossy islands.

Common Tern (Sterna hirundo, L.), (Emo-Cootalia, Esk.)

Eggs and specimens of these birds were brought to me by Eskimo on 20th July, from a small island about six miles from the coast. These were the only ones seen during my stay here.

Great Northern Diver, Loon (Colymbus torquatus, Brunnick).

The first of these birds seen was on 1st June, and the last seen 20th August. None of the young of this bird were found, and I think that very few breed here.

Red Throated Diver (Colymbus Septentrionalis L.), (Coxzow Esk.)

This bird arrived about 20th June, and was often seen during the summer.

Only one nest of this bird was seen, a little above high tide mark; and the Eskimo informed me they could seldom be found.

On 7th August some fledglings were seen, and all had disappeared by 28th September.

Black Guillemot (Uria grylle, L.).

This interesting little bird is seen here throughout the year, being most numerous during the summer.

During the coldest weather it was often taken on small pieces of water where the ice had been broken by the ever-changing tides.

Quantities of eggs of this bird were brought to me by Eskimo from an island about four miles from the coast, and fledglings were seen on 10th August.

Little Auk (Mergulus alle, L.).

A small number of these birds were seen some distance from the shore during the summer, but nothing could be learned of them. One specimen was taken.

Besides those in the above list, several other birds were seen, including varieties of gulls, skuas and a small land bird; but as specimens could not be secured, and they could not be identified, I have not included them in this list.

Insects.

The first insects seen were a single species of spider and fly on 1st June, and it was not until three weeks later that other forms made their appearance, excepting a humble bee, which was seen on 14th June.

On 30th June the first butterflies were seen, and a little later insect life was at its extreme height, lasting until about 5th August, when it declined rapidly, and a weeks later few insects were to be seen. During this time there would be periods of several days of dull weather when bees only were to be seen on the wing.

A large collection of Lepidoptera, Hymenoptera, Coleoptera and Diptera was made, but it is to be regretted I have only succeeded in getting the butterflies identified, of which the following is a complete list, and they are the only species that were seen during my stay in the Straits.

—	First seen.	Numerous.	Last seen.
Colias Hecla, Lef	July 17	July 20 to Aug. 4	August 15.
Colias Nastes, Bd	July 17	July 20 to Aug. 5	August 17.
Argynnis Polaris, Bd	June 30	July 10 to Aug. 1	August 5.
Argynnis Freya, Thunb	June 30	July 10 to Aug. 1	August 4.
Chionobas Semidea, Say	July 1	July 5 to Aug. 30	August 9.
Chionobas Crambis, Frey	June 30	July 5 to Aug. 30	August 10.
Chionobas Taygeta, Hub	June 30	July 5 to Aug. 30	August 10.
Lycæna Agnilo, Bd	July 26	July 26 to Aug. 8	August 5.

These butterflies were identified by W. H. Edwards, Esq, of New York.

Flora.

In adding the following list of plants to this report I am much indebted to the kindness of Prof. Lawson, of Dalhousie College, Halifax, who identified all those in my collection.

Notes upon the growth of each plant were generally made from individual specimens, and in all cases were made upon those in the same neighbourhood where exposure, soil, &c., were similar.

List of Plants in Natural Order.	In Bud.	In Leaf.	In Flower.	Seeds Ripe.	Withering.	Remarks.
Ranunculaceæ :—						
Ranunculus nivalis, L.	.....	June 30	July 5	Aug. 18	Aug. 20	Growing in very damp soil.
R. hyperboreus, var. pyginæus	....	.....	July 25	....	....	
Papaveraceæ :—						
Papaver alpinum, L. (nudicaule)	May 20	June 1	June 30	Aug. 6	Sept. 1	
Cruciferæ :—						
Draba alpina. L., var.	....	June 25	July 1	.....	.....	
Cochlearia officinalis, L.	June 15	June 22	June 22	Aug. 18	Aug. 26	
Caryophyllaceæ :—						
Cerastium alpinum, L.	June 15	June 22	June 30	Aug. 15	Sept. 8	
C. vulgatum, L.	....	....	....	....	....	
Stellaria longipes, var. d. (tacta, Richards)	June 15	June 22	July 8	Aug. 20	Sept. 12	
Lychnis apetala, L	....	June 30	July 5	Aug. 20	Aug. 20	
L. apetala, var. affinis.	June 15	June 22	July 2	Aug. 14	Aug. 20	
Silene acaulis, L	May 26	June 1	July 5	Aug. 22	Sept. 8	Sept. 16.—Some leaves still green.
Houckeneya peploides, Ehr.	June 10	June 20	July 10	Aug. 6	Sept. 1	
Leguminosæ :—						
Astragalus alpinus, L.	June 20	June 25	June 30	Aug. 19	Aug. 25	
Oxytropis arctica, R. Br.	June 20	June 26	July 7	Aug. 20	Sept. 5	
Rosaceæ :—						
Dryas integrifolia, Vahl.	June 9	June 18	July 1	Aug. 20	Sept. 1	
Potentilla hivea, L	.....					
P. maculata, Lehm	May 25	June 3	June 22	Aug. 6	Aug. 20	Sept. 5.—Some leaves still green.
Rubus chamæmorus, L	June 20	July 5	July 7	Aug. 5	Sept. 1	
Onagraceæ :—						
Epilobium latifolium, L.	June 25	July 1	July 15	Sept. 5	Sept. 9	
Haloragæ :—						
Hippuris maritima, Hellen.	.....	.....	.....	.....	.....	
Saxifragaceæ :—						
Saxifaga cernua, L	June 20	.....	July 10	Aug. 27	Sept. 3	
S. tricuspidata, Retz	May 25	June 10	July 4	Aug. 20	Sept. 12	
S. oppositifolia, L.	May 20	June 1	June 18	Aug. 15	Aug. 25	
S. rivularis, L	....	July 1	July 10	Sept. 3	Sept. 8	
S. nivalis	June 23	June 30	July 7	Aug. 26	Sept. 8	
S. nivalis, L. var. B.	....	....	....	....	....	
S. caespitosa, L.	May 20	June 1	June 28	Aug. 25	Aug. 31	
Parnassia palustris, L.	.....	.....	.....	.....	.....	
Compositæ :—						
Erigeron uniflorus, L.	....	June 28	July 10	Aug. 27	Sept. 3	
Arnica alpina, Læst	June 27	July 5	July 12	Aug. 20	Sept. 3	
Antennaria alpina, L	May 26	June 10	June 22	Aug. 12	Aug. 12	
Taraxacum officinale, var. palustre. D. C. (B. salinum, E. Meyer)	June 3	June 20	July 4	Aug. 1	Sept. 5	
Matricaria inodora, var. nana	.....	.....	July 28	.....	.....	

LIST OF PLANTS—*Continued.*

List of Plants in Natural Order.	In Bud.	In Leaf.	In Flower.	Seeds Ripe.	Withering.	Remarks.
***Campanulaceæ*:—**						
Campanula uniflora, L.	June 25	July 1	July 5	Aug 16	Aug. 25	
***Ericaceæ*:—**						
Vaccinium uliginosum, L.	June 15	June 25	July 7	Aug. 25	Sept. 10	
V. Vitis-Idæa, L.	May 20	June 1	July 1	Aug. 31	Sept. 10	Leaves remain green throughout the winter. Fruit does not fall until spring.
Cassiope tetragona, L.	June 1	June 15	June 25	Aug. 25	Sept. 5	Leaves remain green during the winter.
Arctostaphylos alpina, Spr.	June 1	June 22	June 22	Aug. 31	Sept. 14	Large quantities of the fruit of this plant is eaten by Eskimo.
Ledum palustre, L.	May 25	June 1	July 1	Aug. 26	Sept. 8	
Diapenzia Lapponica, L.	May 20	June 1	July 1	Aug. 31	Sept. 5	Some leaves are green throughout the winter.
Pyrola minor, L.	.....	May 25	July 10	Aug. 30	Sept. 6	
Rhododendron Lapponicum, L	May 15	May 25	June 25	Sept. 5	Sept. 10	
***Borraginaceæ*:—**						
Mertensia maritima, Don	June 15	June 22	July 5	Aug. 25	Aug. 28	
***Scrophulariaceæ*:—**						
Pedicularis flammea, L.	.....	July 5	July 12	Aug. 20	Aug. 25	
P. Langsdorffii, var. lanata A. Gr.	June 1	June 10	June 20	Aug. 12	Aug. 18	
P. hirsuta, L.	June 1	June 15	June 20	Aug. 10	Aug. 20	
P. Lapponica, L.	July 3	July 12	July 17	Aug. 26	Aug. 30	
***Plumbaginaceæ*:—**						
Armeria vulgaris, Willd.	June 15	June 22	June 30	Aug. 31	Aug. 31	
***Polygonaceæ*:—**						
Oxyria digyna, Hill; (remformis, Hook)	June 10	June 15	June 22	July 28	Sept. 11	
Polygonum viviparum, L	June 12	June 22	July 1	July 25	Sept. 1	
***Empetraceæ*:—**						
Empetrum nigrum, L.	June 28	July 6	.....	.....	Sept. 10	Where sheltered this plant remains green until Sept. 30.
***Salicaceæ*:—**						
Salix herbacea, L.	June 10	June 15	June 22	Aug. 30	Sept. 10	
***Juncaceæ*:—**						
Luzula campestris, Sm. var. (congesta)	June 20	July 1	July 10	Aug. 10	Aug. 28	
***Cyperaceæ*:—**						
Carex alpina, Sw.	.....	.....	.....	.....	.....	
Eriophorum polystachyon, L.	.....	.....	.....	.....	.....	
E. vaginatum.	.....	July 10	July 15	July 25	Sept. 5	
***Graminæ*:—**						
Poa laxa, R. Br.	.....	.....	.....	.....	.....	
P. pratensis, var	May 25	June 12	July 10	Aug. 24	Sept. 8	
Elymus mollis, Trin.	May 25	June 1	July 15	Aug. 28	Sept. 1	
Alopecurus alpinus, L.	June 10	June 20	July 15	.....	Sept. 10	
Hierochloe alpina, L.	June 1	June 22	July 10	Aug. 25	Sept. 1	
Festuca brevifolia, R. Br. ?	June 20	July 1	July 15	Sept. 3	Sept. 8	
Trisetum subspicatum, var. molle, A. Gr.	June 1	June 25	July 15	Aug. 31	Sept. 8	Sept. 20.—Some blades still green.

LIST OF PLANTS—*Concluded.*

List of Plants in Natural Order.	In Bud.	In Leaf.	In Flower.	Seeds Ripe.	Withering.	Remarks.
Filices :—						
Aspidium (Lastrea) fragrans, Sw.		June 1	June 1			Sept. 10.—Leaves still green.
Cystopteris fragilis, Berub		June 30	June 30			Sept. 10.—Leaves still green.
Lycopodiaceæ :—						
Lycopodium selago, L.						
Algæ :—						
Fucus vesicalosus, L.						
Laminaria saccharina, L.						
Alaria Sp., possibly A. margenata, Postelis and Ruprecht.						
Cheetomorpha Piquotiana, Mont.						
Rhodymenia palmata, L.						
Ptilota serrata.						
Ulva latissima, L.						

NOTES.

8th March —Lichens exposed to the sun, now show signs of life, their colours becoming much brighter.

1st June.—Grasses have made very little growth, and few new blades are to be seen, though last year's blades have grown above ground, and can be seen making slow progress with withered points.

10th June.—Up to the present time vegetation has been very slow, and little change has taken place in any of the plants.

From 12th to 22nd June, all plant life appeared to make rapid strides, but after the latter date few plants showed any growth until 10th July when marked changes took place.

9th September.—Very few plants have put forth any new leaves since their seeds were ripe, but many remained green until the first cold nights. Now, however, nearly all have withered or are withering, the leaves in many instances taking the bright autumnal tints that are seen in lower latitudes.

It is very noticeable that the growth of the plants is very much more forward at all times, near the line of high water along the coast, than at a distance of several hundred feet from it.

Flies, which are very numerous here, evidently share very largely with the bee in fertilizing, as they may often be seen crowding about the blossoms of different plants in large numbers.

On 26th May, by way of experiment, a piece of sandy loam was prepared in a well-exposed position, and peas, spinach, turnips and garden cress were sown.

On 22nd June, peas, turnips and cress were well above ground, whilst the seeds of the spinach had scarcely germinated.

On 7th July a few spinach plants were just above ground; the peas were about five inches high, while there was no perceptible change in either turnips or cress.

No further changes of growth of any of these plants were noticeable during the remainder of the summer.

HEIGHTS OF ESKIMO.

I append the following heights of Eskimo as they may be of use to those interested in the subject.

When measured, the Eskimo wore native boots and socks, measuring in all about three-eighths of an inch in thickness.

Men.			Women.		
Age, Estimated.	Feet.	Inches and Half Inches.	Age, Estimated.	Feet.	Inches and Half Inches.
35	5	2½	28	5	1
38	5	5½	26	4	9½
45	5	7	36	5	½
40	5	8	50	4	9½
36	5	4½	30	5	1½
37	5	4			
32	5	4			
48	5	2			
38	5	3			
38	5	7½			
35	5	3			

F. F. PAYNE.
Observer in Charge, Stupart's Bay Station, and Assistant Meteorological Service of Canada.

REPORT BY ROBERT BELL, B.A.Sc., M.D., LL.D., ASSISTANT DIRECTOR OF THE GEOLOGICAL SURVEY OF CANADA.

SIR,—I have the honour to submit the following report on certain scientific matters in connection with the Hudson's Bay Expedition of 1886, and in regard to the results of the examinations which have been made of rocks and ores collected around the Bay and Straits by myself, or which have been handed to me by others, in addition to what was contained in my reports on the Expedition of 1884 and 1885 as to the geology and economic minerals of these regions.

I have the honour to be, Sir,
Your obedient servant,

ROBERT BELL.

To Lieutenant A. R. GORDON, R.N.,
Commanding Hudson's Bay Expeditions.

ADDITIONAL NOTES ON THE GEOLOGY OF THE NORTH-WEST COAST OF HUDSON'S BAY.

In the last report which I had the honour of submitting to the Minister of Marine and Fisheries, it was stated that from Seal River northward to Eskimo Point, a distance of about 140 statute miles, the coast was low, with the exception of an occasional isolated hill, probably of drift, and that there was no reason to believe that this interval is occupied by nearly horizontal Silurian strata, similar to those which underlie the section between Nelson River and Cape Churchill. At Eskimo

Point a rocky shore is said to begin, and to extend, with some interruptions, northward to Chesterfield Inlet, a distance of about 180 statute miles. It was also mentioned that the rocks of this part of the coast would appear to consist principally of a variety of schists which cannot be distinguished from those we have classed with as Huronian. I have received from a friend a most interesting collection of lithological specimens, which, at my request, he had broken from the fixed rocks at numerous points along the coast from Eskimo Point all the way to Chesterfield Inlet. Taken as a whole these rock specimens indicate the Huronian series, and from the great extent of coast which they occupy, it may be inferred that they also extend inland and cover a large geographical area. We have some independent evidence also that this is the case. Examples of Laurentian rocks seem to be absent from the collection, but some of the specimens may belong to the intermediate formation, which I have described as coming between the Huronian and the Manitounuck or Nipigon formations on the Eastmain Coast. The Huronian series is the principal repository of economic minerals in the region of the Great Lakes and Hudson's Bay. Marble Island, lying off that part of the coast under consideration, was examined in 1884, and found to consist of whitish quartzites, like those of Lake Huron, as described in my report for that year.

The following list of the rocks in the collection above referred to is considered worth inserting here, as it affords the only evidence as yet available in regard to the geology of an extensive coast, which promises to be important from an economic point of view, and well worthy of careful examination:—

Chloritic schist, dark grey cherty schist, hard dark argillaceous slate, finely ribboned hornblende and quartz schist, imperfect gneiss, dark silicious breccia with calcspar, dark-green crystalline pyroxene rock, dark chocolate-coloured aceous argillaceous sandstone with conchoidal fracture, calcspar vein-stones, semi-translucent white quartz, red aplite of medium texture, rather fine-grained grey granite, grey diorite, consisting of light-coloured felspar and dark hornblende in small distinct crystals, giving it an even and finely speckled appearance, fine-grained hornblende schists, greenstones, quartz and epidote rock, light grey coarse-grained sandstone altered to quartzite and holding fragments of indurated red shale, compact banded white quartz rock with crystals of iron pyrites in some of the layers, light quartzite like that of Marble Island, grey felsites, crystalline hornblende-rock, diorite, consisting of compact white feldspar with long crystals of dark hornblende, banded grey hornblende and quartz-rock with some layers approaching chert, mica schists of different kinds, mixed hornblende and mica-schist, chocolate-coloured porphyry with flesh-coloured crystals of felspar and grains of clear quartz, granulite, red jaspar with dull fracture, hard brownish-red sandstone, grey felsitic quartzite with lenticular patches of dark mica-schist, chloritic schist, the granular iron pyrites associated with dark-greenish schist above referred to, several hundreds of cubes of iron pyrites, mostly small, taken from a dark glossy schist, quartz veinstone with large scales of light-coloured mica together with garnets, calcspar veinstone with embedded crystals of quartz and having grey steatitic rock adhering to it, also a veinstone of quartz containing silky radiating aggregates of hornblende and a few specks of calcspar and iron pyrites; some greenish schist is attached to this specimen. A loose piece of brown-weathering dolomite with reticulating strings of white quartz was found on Marble Island.

The bulk of the primitive Laurentian System in the northern parts of the Dominion consists of massive and very crystalline varieties of gneiss, generally much contorted and seldom exhibiting much regularity of arrangement over large areas. In some of the more northern regions of the country, however, as in the Counties of Frontenac, Lanark, Renfrew, Ottawa and Argenteuil, certain sub-divisions may be recognized and traced by their persistence and individuality of character for considerable distances. It is in such portions of the System that economic minerals such as crystalline limestone, iron ores, graphite, sheet mica, iron pyrites and phosphate of lime are met with, and here also we find a variety of species of minerals which have not been observed among the massive contorted gneisses referred to.

On the north side of Hudson's Straits in the neighbourhood of Turenne Island

there is apparently a recurrence of these more interesting and perhaps newer varieties of Laurentan rocks. Specimens of all the economic minerals just named, except phosphate of lime, have been brought to members of the Expedition by the natives of this vicinity who report them as occurring in abundance. The gneisses along this part of the north shore exhibit a regularity in their strike and marked alterations of character in different belts, such as are not generally to be seen in the north. It may be worth mentioning in reference to this subject that a crystal of sphene an inch in diameter was obtained from an Eskimo who had found it on the mainland opposite Turenne Island.

It was mentioned in my report for 1884 that a specimen of greyish crystalline limestone was picked up near Ashe's Inlet, Turenne Island, which bears a very close resemblance to a variety common in the Laurentian lands of the Ottawa Valley. Since that time Mr. Hoffmann has carefully examined this specimen and found it to contain rounded grains of a monoclinic and a triclinic felspar—the one a potash felspar, apparently orthoclase, and the other a soda-lime felspar, probably oligoclase.

On the Occurrence of Gold and Silver in Hudson's Bay and Straits.

In 1877 I brought specimens of iron pyrites from a small vein cutting gneiss on a point about one mile south of the mouth of Great Whale River, on the east coast of the Bay, about latitude 55° 17′, in which Dr. Harrington, then chemist to the Geological Survey, discovered both gold and silver, by assay. He also found both these metals in small quantities in iron pyrites which I took from veins in the bluish-grey dolomite forming Dog Island, close to the land, a few miles north of the Cape Jones of the Eastmain Coast. In 1885 I obtained from the north-west coast of Hudson's Bay, an angular specimen of crystalline granular iron pyrites, containing grains of quartz and apparently broken from a large vein. The friend who presented it to me had obtained it at the bay north of the Cape Jones of that coast, and which forms the southern horn of Rankin Inlet, not far south-west of Marble Island. It has been assayed by Mr. G. C. Hoffmann, now chemist to the Geological Survey, and found to contain a trace of gold and ·233 of an ounce of silver to the ton of 2,000 lbs.

In 1850 Professor James Tennant, of King's College, London, had submitted to him some rock specimens from Repulse Bay, at the head of Roe's Welcome, a northern extension of Hudson's Bay. He describes one of these specimens as "quartz coloured by oxide of iron and containing minute particles of gold." From Tennant's description of the few specimens he obtained from this locality, I should judge the rocks there to correspond with those of the ordinary Huronian bands north-west of Lake Superior, in which free gold has also been found in several places.

On the Eastmain Coast (as stated in previous reports) a few tons of galena have been extracted from the lead-bearing band of dolomite about three miles north-east of the Hudson's Bay Company's trading post at the mouth of Little Whale River. This one was found by Dr. Harrington to contain 5 104 ounces of silver to the ton of 2,000 lbs. Galena occurs in larger masses in similar dolomite on the south side of the entrance to Richmond Gulf. A sample of this ore yielded 12·03 ounces of silver per ton to the same assayer.

The small island in the north-western part of the Ottawa Group (latitude 59° 48′, longtitude 80° 14′) in the north-eastern part of Hudson's Bay, on which I landed in 1885, was found to consist of a dark greenish grey diorite. A small vein, consisting of an intimate mixture of plagioclase and calcite with a few specks of iron and copper pyrites, cuts this rock. A sample from it has been assayed by Mr. G. C. Hoffmann, chemist to the Geological Survey, and found to contain distinct traces of gold, along with ·069 of an ounce of silver to the ton of 2,000 lbs.

The gneiss near the observatory station at Stupart's Bay (south side of Hudson's Straits) is cut by veins of white sub translucent to translucent quartz, carrying iron pyrites and sometimes much stained with hydrated peroxide of iron. A sample made up of fragments from some of these veins, assayed by the same gentleman, contained a trace of gold but no silver.

A vein cutting the gneiss at the observatory station at Port Burwell was described in my report for 1884.

The gauge of this vein consists of a greyish-white translucent quartz, with which is associated a little barite, carrying small quantities of iron pyrites. Some of the fragments collected were stained and coated with hydrated peroxide of iron, and some of the crystals of quartz in this vein had a bright red colour. On assay by Mr. Hoffmann it yielded a trace of gold but no silver.

A specimen of quartz was obtained from a vein said to be of considerable size on the south side of Nachvak Inlet, opposite Skynner's Cove, on the northern Labrador coast, and found by Mr. Hoffmann to contain a trace of gold and ·041 of an ounce of silver to the ton of 2,000 lbs. The quartz was of a white sub-translucent variety, seamed and in part stained with hydrated peroxide of iron.

The opportunities heretofore afforded for the searching after economical minerals in Hudson's Bay and Straits, have been few and very limited. For the most part they have been merely casual or else accessory to other explorations. From the examinations of the last few years, however, some idea may be formed of the general geological conditions of these regions and of the nature and distribution of the rock formations; and these were outlined in my report of last year, published by the Honourable the Minister of Marine and Fisheries. The localities, and, to some extent, the distribution of the more likely rocks to afford the precious metals having now been ascertained, and their actual presence, in a number of cases, demonstrated, further search may be more advantageously carried on, and there is little doubt these metals will hereafter be found in larger quantities in the above regions.

Notes on Icebergs and Field-Ice.

The phenomena relating to icebergs and field-ice are of so much interest and importance in various ways that some observations which I made on these subjects while connected with the Hudson's Bay Expeditions, and communicated to the Royal Society of Canada at its last meeting, may be considered worth embodying in the present report.

Icebergs.—During the last two summers, the writer, while accompanying the Government expeditions to Hudson's Strait, made by the steamships "Neptune" and "Alert," enjoyed excellent opportunities for observing icebergs, which, for weeks, were the most common objects to be seen from the vessels. A stream of bergs, several hundreds of miles wide and about two thousand miles long, comes constantly southward. These floating islands of ice are more abundant at some seasons than at others, but they are never absent. Upwards of one hundred may often be counted from a ship's deck at the same time. When we consider the mass of each of these innumerable bergs and the constancy with which they come floating on, we must be struck with the almost inconceivable amount of ice which is every year brought to the edge of the Gulf Stream. What becomes of this enormous quantity of ice? Most seamen will tell you it sinks on striking the warm waters. This, of course, is impossible, but the rapid disappearance of the bergs after reaching the banks of Newfoundland does not seem to have been fully accounted for. Up to this time they do not appear to have undergone any marked alteration or rapid reduction in size in the course of their voyage southward. When one happens to become stranded on the coast of Labrador or Newfoundland, it will remain for months, even under the summer sun, with but little diminution in bulk, until some day it starts off again with a high tide, and a strong wind favouring its departure.

The temperature of the interior of icebergs is probably a good deal below 32° Fah. While forming parts of glaciers in the Arctic regions, they have remained for ages at the low temperature of these high latitudes, and owing to their great mass, they would gain heat slowly in the short summers. It is well known that each berg is surrounded by a wide zone of cold water, and that in thick weather the proximity of one of them to a ship may be discovered by hauling a bucket of water on deck and testing it with a thermometer. As the berg moves south with the ocean current, it carries its chilly zone with it, like a planet surrounded by its atmosphere.

The Gulf Stream spreads itself on the surface of the Arctic Current, and towards its edge it is probably not deep. The berg, extending down to a great depth, is borne with comparative rapidity into the opposite-flowing warm surface-current. The zone of very cold water, which until now has remained around the berg, is immediately swept away, exposing its surface suddenly to a temperature, perhaps 30° Fah. warmer than it has ever experienced before. This rapid change would, no doubt, cause the ice to crack and fall to pieces in a very short time. The berg, lightened above, would rise, and so bring up new parts of the old ice to be acted upon by the warm water, which would always be increasing in depth. The fresh surface of the fragments of the berg, having the low temperature of its interior, would be immediately acted on in the same way, and these would, in their turn, become fractured over and over again, until the whole mass was reduced to a multitude of small pieces, floating on the surface of the warm water, with warm air above it. As they become scattered about, the process of fracturing, owing to the contrast in temperatures, would continue to go on, and thus every trace of the berg would quickly vanish. In order to test the behaviour of ice at a low temperature when suddenly immersed in warm water, the following experiment was performed in Ottawa on 27th February, 1885. A piece of ice, weighing about ten pounds, which had been freely exposed to the outer air, having then a temperature of 5° Fah., was brought into the house, wrapped in a fur rug to protect it from the heat, and plunged into a bath of water at a temperature of 87° Fah. Instantly, it began to crack in all directions, with distinct detonations, which could be heard in all parts of the room. In explanation of the fact that icebergs are occasionally met with far south of their usual limit, it may be suggested that these have been retarded by stranding or by gales of wind near the Newfoundland coast until their temperature has been raised; and that then, floating south-westward near the land, they have afterwards been carried out towards mid-ocean by the Gulf Stream.

It is supposed by some that icebergs have been the means of transporting vast quantities of earth and rocky materials from north to south in former geological times, and that this action is still going on. There does not, however, seem to be much foundation for such speculations. Out of the great number of bergs seen during the two voyages above referred to, only a few had any foreign matter, or even marks of discolouration upon them. It was remarked that towards the entrance to Hudson's Strait, cases of the kind were most frequent among the bergs furthest east. In the event of a berg carrying such matter, it would naturally become more visible as the surface melted by the sun's heat on coming south, and if any were present, it should be perceptible by the time the berg reached the latitude of Cape Race; yet, out of large number which may often be seen from the deck of an Atlantic steamer near this cape, it is very seldom that one is noticed carrying any earth or stones. It would, therefore, appear that icebergs have played only a small part in the transportation of boulders or earth during either Post-Pliocene or modern times.

Field ice.—This, which we had ample opportunities of observing on the two voyages referred to, appears to be a more important agent in the transport of earthly matter. The northern lands of the Dominion are so divided by the sea as to give an immense length of coast line. This is all favourable to the formation of the vast quantities of ice which encumber the shores in spring. In many parts where the land is high and steep, quantitities of dust and small pieces of rock are blown out upon the ice by the gales in winter. Landslides and avalanches precipitate coarser debris from the steep mountain sides upon the ice below. This is the case, especially, in the long fjords in Northern Labrador. In the spring, earth, gravel and stones are carried upon it by the torrents formed by the melting of snow. When the sun has loosened this ice sufficiently from the shore, the next spring tide carries it away. In shallow bays with high tides, such as Ungava Bay, the ice-pans which float in during the autumn and rest against the low shores, become impregnated with the sand and mud, which freeze to the sides at low tide and are incorporated in them as they increase in size during the winter. In the middle of summer, the surface having thawed, the whole of this ice becomes "foxy," as it is termed, or shows discolour-

ation. Many of the pans are completely covered with mud, sand, gravel and stones. Shells and sea-weeds may also be observed on some of them, and all have received more or less dust, which generally gives them a brownish or greyish colour. When a pan is suddenly overturned, this gives rise to a dense cloud in the clear sea water. Field ice would therefore appear to be a more important agent in transporting earthly matter than icebergs. It has been imagined by some that the smoothing and rounding of the rocks, which may often be observed on the shores of the Arctic and sub-Arctic regions, is largely due to a chafing action of ice of this class. There seems to be little ground, however, for this assumption. When the field-ice packs against the shore, it is seldom tossed by the waves of the sea, which are entirely broken down by a comparatively narrow field, so much so, that the sealing vessels are accustomed to run into such ice for shelter, and after they have penetrated a short distance, they are considered safe. Ice of this kind does not shove or pile itself on shore, pushing up the boulders and gravel in front of it, like the ice of our rivers when they break up in the spring. On the contrary, it always appears to lie quietly and easily against the shore. This is probably owing to the fact that the open spaces between the pans allow of a great amount of compression and adjustment, thus relieving the pressure, which is seldom directly against the shore. Indeed, it sometimes happens that the ice will unaccountably leave the shore against the wind.

Dr. Franz Boas of Berlin has observed that in Baffin Land the accumulation of ice in narrow channels, through which the tide sweeps, increases the strength of the current, which sometimes runs with great velocity. In one place, under such circumstances, he observed that the stones, boulders, and finer debris were set in motion and bored out what he calls giant-kettles in solid granite. Similar kettles were seen at this locality, high above the present sea level, showing that the same action had been going on in past ages. This observation recalled to the writer the fact that, more than twenty years ago, he noticed great pot-holes on the top of the high limestone cliffs on the east side of the isthmus separating Manitowaning Bay from South Bay on Manitoulin Island, Lake Huron. The surface of the rock in the vicinity is destitute of soil, but the earth which had accumulated in the bottoms of these pot-holes, supported trees, and these, growing out of the deep pits, presented a very curious appearance.

Notes on the Extraordinary Darkness of the 29th of August in Hudson's Bay and Straits.

Captain Gordon has referred to the phenomenal darkness which occurred on the night of the 29th of August when the "Alert" was in the vicinity of Cape Wolstenholme. So complete was the obscurity that it was impossible to see objects only a few inches from one's eyes. Mr. Woodworth reports from Digges Island that during the day the air had a smoky or hazy appearance, but it was not particularly marked and on the 29th a heavy rain, lasting from 3 to 11 p. m., had the effect of clearing the atmosphere.

Mr. Percy Woodworth, the observer at Laperrière's Harbour, on Digges Island, Station No. 6, informed me that after this rain, the streams near his station, which are usually very clear and bright, became perfectly darkened. He preserved for me the water which fell into his rain gauge, between the hours above mentioned, amounting to ·5 of an inch. This water which had a smoky appearance with a greenish yellow tinge, has been examined both miscroscopically and chemically with the following results: Mr. Joseph B. Tyrrell, of the Geological Survey reports that under the microscope it "swarmed with *Bacteria* of the genera *Spirillum, Bacterium* and *Bacillus*, and contained numerous small round unicellular algæ. At the bottom of the bottle were several masses of mycelial threads. Great numbers of small ciliate infusia were also swarming about through the water."

I am indebted to Mr. G. C. Hoffmann, chemist to the Geological Survey, for the chemical examination of the water. He reports as follows: —

"Results of a partial qualitative analysis of rain water that fell into rain-gauge

at Station No. 6, between the hours of 3 p. m., and 11 p. m. (about) on the 29th day of August, 1886.

"The amount 60 c.c., of water was far too small to admit of any quantitative determinations. As handed to me it had a greenish-yellow colour, a mouldy smell and contained a good deal of suspended matter, apparently organic.

"The suspended matter having been examined by Mr. J. B. Tyrrell, was on this occasion disregarded. It was filtered off. The filtered water was examined by Mr. E. B. Kenrick and found to contain very small quantities of the following acids and bases:

"Acids—Hydrochloric, nitrous.

"Bases—Potash, soda, ammonia, lime.

"Note I.—Changes had, doubtless, occurred in the water since the time of its collection.

"Note II.—(1) Nitric acid is commonly present in rain-water, chiefly in combination with ammonia. (2) Nitrous acid is also present in rain-water. (3) Rain-water, perhaps always, contains a small amount of organic substance. (4) Rain-water sometimes contains a very small amount of hydrochloric acid, sodium or calcium chloride and other saline substances."

I have received a letter from Mr. William Woods, meteorological observer at York Factory, on the opposite side of Hudson Bay, dated 10th December, 1886, in which he remarks: "At York, on 28th August, we had great darkness, partly owing to the smoke that was around; but we had very little wind till Monday the 30th, when we had a gale of considerable force. We had a very high tide, fully 10 feet above the highest tide that I have seen at York Factory, with one exception, and then the tide exactly rose to the same height, namely, 10 feet above an ordinarily high tide."

It may be interesting to remark, in connection with this subject, that in the region around Hudson Bay, or between it and the Great Lakes, almost every year since 1869 I have observed a marked disturbance in the weather about the end of August or beginning of September, generally accompanied by a hazy atmosphere and either rain or snow, the latter always disappearing again. Immediately after these snow-falls a distinct smell, like that of ozone, could always be perceived in the woods. Letters afterwards received from the interior of the Labrador peninsula gave accounts of corresponding weather which had been experienced there two or three days later than in the country west of James' Bay.

List of Plants from Nottingham Island, Hudson's Straits.

Collected by Mr. John McKenzie, B.A.Sc., Observer at Station No. 5, and determined by Professor J. Macoun, Botanist of the Geological Survey.

1. Ranunculus nivalis, Linn.
2. Draba Alpina, Linn.
3. do var. glaciatis, Dickie.
4. Entrema Edwardsii, R. Br.
5. Silene acaulis, Linn.
6. Lychinis apetala, Linn.
7. Stellaria longipes var. Edwardsii, T. & G.
8. Cerastium Alpinum, var. Fischerianum, T. & G.
9. Astragalus Alpinus, Linn.
10. Dryas actopetala, var. integrifolia, Cham. & Schulet.
11. Saxifraga oppontifolia, Linn.
12. do caspitosa, Linn.
13. do rivularis, Linn.
14. do cernua, Linn.
15. do Hirculus, Linn.
16. do tricaspidata, Retz.
17. do aizoides, Linn.

18. Epilobium latifolium, Linn.
19. Erigeron uniflorus, Linn.
20. Crysanthemum integrifolium, Richards.
21. Matricaria involuera, var. nana, Hook.
22. Vaccinium uliginosum, Linn.
23. Cassiope tetragona, Don.
24. Pyrola rotudifolia, var. pumila, Hook.
25. Mertousia maritima, Don.
26. Pedicularis hirsuta, Linn.
27. Polygonum viviparum, Linn.
28. Oxgria digyna, Campera.
29. Empetrum nigrum, Linn.
30. Salin arctica, R Br.
31. do herbacea, Linn.
32. Salix chlorophylla, Anders.
33. do reticulata, Linn.
34. Luzula spicota, Deav.
35. Carex saxatilis, Linn.
36. Alopieurus Alpinus, Smith.
37. Festuea ovina, var. brevifolia, S. Wat.
38. Dupontia Fischeri, R. Br.
39. Arctagrootis latifolia, Gris.
40. Trisetum subspicatum, var. motle, Gray.
41. Equisetum scirpoides, Michx.
42. do arvense, var. seritimus.
43. Lycopodium Lelago, Linn.
44. Ptilota serrata, Kütz.

ROBERT BELL.

GENERAL REMARKS ON THE NAVIGATION OF HUDSON BAY AND STRAITS.

Having now made voyages on three years to Hudson Straits, and having carefully examined the reports by the observers as to the formation and movements of the ice in Hudson Straits, I have the honour to submit the following statement in regard to the navigation of these waters.

In discussing this question I think it well to state that I am not required to report on the commercial aspect of the case, and whether Hudson Straits navigation can be made to pay, nor do I, in the seasonal limits given, mean to state that it is impossible for a ship occasionally to get in earlier or leave later; but having carefully considered the subject, I give the following as the season during which navigation may, in ordinary years be regarded as practicable for the purposes of commerce; not, indeed, to the cheaply built freight steamer, commonly known as the "Ocean Tramp," but to vessels of about 2,000 tons gross, fortified for meeting the ice, and of such construction as to enable them to be fair freight carriers. These vessels must be well strengthened forward; should have wooden sheathing, and be very full under the counter; the propeller should be of small diameter and be well down in the water. I place the limit of size at about 2,000 tons, because a larger ship would be somewhat unwieldy, could not make such good way through the loose ice; and being unable to turn so sharply she would get many a heavy blow, that the smaller ship would escape.

I consider that the season for the opening of navigation to such vessels as the above will, on the average, fall between 1st and 10th July. The position and movements of the ice I have already discussed, and need not here repeat. The closing of the season would be about the first week in October, partly on account of the descent of old ice from Fox Channel into the western end of the Straits; this old ice being

rapidly cemented into solid floe by the formation of young ice between the pans; in such ice, no ship, however powerful, could do anything to free herself. At this time, too, the days are rapidly shortening, and snowstorms are frequent though not of great duration.

The tidal currents in Hudson Straits add very considerably to the risks of navigation. These currents vary in velocity from three to six knots per hour, and the uncertainty of this effect on ships has already been pointed out in the case of the "Fury" and "Hecla." I have myself, when fast in the ice in thick weather, tried the ground log, and have made out apparently the rate and direction in which we were being carried, but in almost every instance, when we began to haul in the line, it fouled some spur of ice beneath, and weights and line together would be lost.

The last, and indeed the most serious, difficulty that I anticipate is in the faulty working of the compasses, especially about the critical ground off Digges Island. Mansell Island can, under most circumstances, be kept clear of by the lead, but in the neighbourhood of Digges Island nothing but the most sleepless vigilance and the greatest caution will save a ship from disaster.

Steamships built for the Hudson Bay trade would be constructed largely of iron; and while it is admitted that it is theoretically possible to perfectly compensate and adjust a ship's compass, so that it shall (provided the magnetic condition of the ship remains unchanged) remain in adjustment, no matter what magnetic latitude the ship may be in, in practice it is found not only impossible to so perfectly adjust the standard compass of an iron ship, but that even supposing this to be done almost perfectly, the magnetic condition of the ship is subject to changes, both extensive and frequent, arising from so many and widely various causes, that only repeated observations for compass error can ensure safety.

At the western end of Hudson's Straits we are approaching the Magnetic Pole, the dip being 86° at Digges Island. This means great vertical force with the horizontal force approaching the vanishing point. The horizontal force may be considered as that portion of the earth's magnetic force which determines the direction of the magnetic needle, when counterpoised so as to hang horizontally; the vertical force is that which by induction in the iron of the ship to a great extent affects the deviation or ship errors. In making a voyage from the United Kingdom to Hudson's Bay, the dip changes from 67° to 87° nearly. The practical meaning of this is that supposing a residual error of 1° left under corrected on one of the cardinal points, when adjusting at Liverpool, this would, inasmuch as the deviation changes, roughly speaking, with the tangent of the dip, have become an error of 6° when the ship had gone to a place where the dip was 87°.

Further, in an iron ship any severe concussion changes the magnetic condition of the ship, hence when working through ice constant changes would be taking place in the ship's attraction, and, consequently, in the compass errors.

I am further of opinion that in an iron ship, making the voyage between, say Liverpool and Hudson's Bay, on arrival off the western end of the Straits, the compass will not work.

Altogether I consider the navigation of Hudson's Straits as being more than ordinarily difficult, with shores inhospitable and bleak, presenting such a picture of loneliness and desolation, that it takes some time to get accustomed to it. The only safety in thick weather lies in the constant use of the lead and keeping a bright lookout, as the dead-reckoning is frequently in error to a considerable extent.

Surveying.

I have already noticed the work done at York and Churchill this year, and plans of these places accompany this report. In addition to this, the geographical position of several points has been determined, and short pieces of coast line outlined as opportunities were afforded in the course of the voyage. Copies of the charts and plans, together with the results of tidal observations, will be forwarded hereafter.

Before closing my report, I desire to acknowledge the highly satisfactory way in which every officer and man belonging to the ship and expedition performed their duties. Strict discipline was maintained on board, and the work which was frequently most labourious was at all times performed with alacrity and cheerfulness.

As to future work on Hudson's Straits and Bay I have already pointed out in the portion of the report dealing with the resources of the region, that it is desirable a Government vessel should annually visit that region for the purpose of regulating the fisheries, &c.; such a vessel enabling the surveying work to be continued for one or two more seasons would go far to make the charts sufficiently accurate for the recognition of the coast line, and would probably also get a large amount of valuable sounding work done in this western end of the Straits, where it would be of the greatest value to navigation.

I have now to conclude this my third report on Hudson's Bay work, and trust that my endeavours to carry out your instructions, and the discussion of the results of our observations, may meet with your approval.

All of which is respectfully submitted

By your obedient servant,

ANDREW R. GORDON,
Lieut. R. N., Comd'g H. B. Expedition.

METEOROLOGICAL OBSERVATIONS.

TABLE I.—ABSTRACT of Meteorological Observations at Belle Isle, Labrador,

Months.	Temperature.					Amount of Sky Clouded 0-10.	Rain.		Days of Snow.	Whole No. of Observations.	N.	N.E.
	Average.	Average of Max. and Min.	Highest Temperat.	Lowest Temperat.	Mean Daily Range.		Amount.	Days of				
1885.	°	°	°	°	°							
October	36·19	35·89	49·0	25·0	6·07	7·2	1·85	8	5	84	7	3
November	27·20	27·52	40·0	— 3·0	8·23	6·9	3·77	4	6	90	10	15
December	12·33	12·21	39·0	—12·0	6·38	6·9	1·73	4	11	93	9	8
1886.												
January	14·71	14·58	40·0	—15·0	8·26	7·6	2·53	9	13	93	8	14
February	11·55	11·34	39·0	—11·0	8·90	6·8	0·30	4	14	84	19	15
March	16·54	16·54	39·0	—14·0	9·03	7·0	1·83	6	14	93	10	37
April	25·16	24·55	40·0	2·0	9·36	6·0	0·14	9	9	87	12	25
May	37·59	38·18	59·0	19·0	7·26	6·9	3·41	10	5	80	2	8
June	47·21	47·24	59·0	38·0	8 73	7·5	6·56	14	.....	90	3	10
July	49·97	50 37	62·0	34·0	8·48	8·2	10·73	18	.....	86	5	4
August	46·78	47·26	56·0	39·0	7·09	6·8	4·51	5	.....	72	3	8
September	41·71	42·17	50·0	30·0	5·80	7·1	2·01	10	3	90	5	10
Year	30·58	30·65	62·0	—15·0	7·80	7·1	39·37	101	80	1042	93	137

Lat. 51° 53′ N., Long. 55° 22′ W., from October, 1885, to September, 1886.

Direction of Wind.							Velocity of Wind.						Fogs.	
								No. of Times the Velocity was						
E.	S.E.	S.	S.W.	W.	N.W.	Calms.	Average Velocity.	20 Miles.	30 Miles.	40 Miles.	50 Miles.	60 and upwards.	No. of Days.	No. of Hours.
1	4	2	27	20	18	2	14·7	15	5	4	4	3	13	152
1	7	0	17	6	34	0	20·5	30	6	3	9	0	7	88
6	4	4	20	22	20	0	18·0	21	10	7	4	1	2	32
6	9	3	21	10	22	0	15·0	19	8	3	0	6	12	168
6	2	1	6	20	13	2	15·0	21	12	5	2	0	8	144
9	3	0	7	15	12	0	17·0	22	7	11	2	1	17	312
8	3	0	8	14	15	2	14·3	16	8	6	3	0	2	24
6	18	1	14	17	11	3	7·0	8	3	2	0	0	12	216
16	11	8	10	24	6	2	10·0	17	3	3	1	0	16	248
12	10	2	14	26	13	0	10·0	14	3	1	1	1	25	368
8	1	2	12	30	8	0	14·5	16	6	7	4	0	10	104
3	1	3	17	36	15	0	11·0	23	3	1	0	0	12	136
82	73	26	173	240	187	11	15·92	222	74	53	30	12	136	1992

TABLE II.—Abstract of Observations taken at Port Burwell, Station No. 1, 1st

Months.	Barometer.				Temperature.							
	Mean.	Highest Obs.	Lowest Obs.	Range.	Mean.	Highest Obs.	Lowest Obs.	Mean of Warmest Day.	Mean of Coldest Day.	Mean Max.	Mean Min.	Range.
1885.												
October	29·838	30·312	28·918	1·394	29·99	42·0	15·5	35·97	18·83	32·60	28·00	4·60
November ...	30·002	·454	29·360	1·094	22·28	36·0	— 6·0	33·90	1·83	25·84	18·91	6·93
December....	29·707	·604	28 706	1·898	4·80	33·5	—23·0	25·30	—22·70	8·86	— 1·96	10·82
1886.												
January.....	30·034	·750	29·215	1·535	—11·48	17·8	—31·0	12·93	—28·05	—5·53	—18·14	12·61
February	29·823	·015	28·479	2·536	—10·43	27·8	—32 2	35·48	—27·43	—4·11	—15·97	11·86
March.....	·900	·568	28·755	1·813	— ·12	36·2	—24·4	33·43	—20·57	4·77	— 5·53	10·30
April.....	·940	·504	29·244	1·260	14·54	39·0	—12·4	34·60	— 6·77	18·49	9·79	8·70
May.....	·851	·230	29·429	·801	28·03	47·0	10·0	42 07	14 75	31·75	23·68	8·07
June.....	·770	·244	28 863	1·381	35·53	45·2	29·0	40·53	32·32	38·65	32·14	6·51
July.....	·783	·106	29·449	·657	41·56	56·0	31·0	50·70	33·70	45·84	36·82	9·02
August.....	·703	·106	29·219	·887	40·68	67·4	31·8	54·47	35·55	44·54	36·69	7·85
September...	·732	·174	29·204	·970	32·52	45·5	27·0	41·92	30·06	37·84	33·41	4·43
Year.....	29·840	30·422	29·070	1·352	18·13	67·4	—32·2	54·47	—27·43	23·29	14·82	8·47

October, 1885, to 31st September, 1886, inclusive.—Observer, Mr. G. R. SHAW.

Pressure of Vapour.	Relative Humidity.	Dew Point.	Wind.			Cloudiness to Tenths.	Rain.		Snow.		Days Auroras Reported.
			Highest Velocity.	Highest Daily Mean.	Mean Hourly Velocity.		Depth in Inches.	Duration in Hours.	Depth in Inches.	Duration in Hours.	
·145	92·5	26·6	45	33·3	11·8	8·1	·2	18	2·0	60	4
·108	88·8	20·2	65	45·0	11·7	8·8	·2	18	8·0	34	4
.....	.....	.....	80	45·5	13·9	6·8	.....	.....	26·0	58	6
.....	.....	.....	65	53·3	24·3	4·6	.....	.....	6·0	8	10
.....	.....	.....	68	58·8	20·8	4·9	.....	.....	3·0	36	15
.....	.....	.....	55	33·7	15·9	3·4	.....	.....	4·0	31	15
·091	89 8	13·2	60	48·3	17·4	7·5	.....	.....	S.	3	3
·131	86·1	23·3	60	39·2	15·4	7·3	.....	.....	S.	9	3
·198	91·8	33·3	60	48·3	14·0	8·2	·69	14	15·0	15	3
·214	84·1	36·8	67	56·5	17·7	5·0	1·34	8	.....	.....	14
·224	84·4	37·2	55	49·2	13·1	6·6	2·04	16	.....	.....	3
·145	84·4	30·4	60	47·0	10·8	6·9	2·12	12	.....	34	4
.....	87·74	.....	80	58·8	15·48	6·5	6·59	86	64·0	288	89

TABLE III.—Abstract of Observations taken at Ashe Inlet, Station No. 3, 1st Sept.

Months.	Barometer.				Temperature.							
	Mean.	Highest Obs.	Lowest Obs.	Range.	Mean.	Highest Obs.	Lowest Obs.	Mean of the Warmest Day.	Mean of the Coldest Day.	Mean Max.	Mean Min.	Range.
1885.												
September...	29·763	30·21	28·75	1·46	33·68	45·9	21·7	41·12	25·56	37·43	30·19	7·24
October.....	·802	·36	29·41	·95	25·54	35·1	11·7	32·87	15·72	28·55	20·70	7·85
November...	30·062	·41	·57	·84	13·61	27·8	—15·0	24·35	— 11·22	18·41	7·47	10·94
December....	29·667	·17	28·61	1·56	— ·14	29·8	—25·3	23·08	— 20·93	5·56	— 5·29	10·85
1886.												
January.....	30·004	·85	29·01	1·84	—19·34	6·4	—33·2	3·52	— 29·02	—13·25	— 25·29	12·04
February....	29·824	·95	28·60	2·35	—19·27	16·8	—38·1	4·33	— 34·52	—15·24	— 25·44	10·20
March.....	·889	·70	·99	1·71	— 7·96	22·4	—26·9	16·83	— 23·82	— 1·54	— 16·37	14·83
April.	·982	·47	29·51	·96	8·37	28·8	—15·0	25·32	— 9·65	12 90	1·71	11·19
May	·795	·29	·27	1·02	24·64	28·3	2·8	36·77	9·25	28·53	19·17	9·36
June.....	·811	·23	·13	1·10	36·62	46·1	27 5	41·38	33·08	41·31	31·58	9·73
July.....	·781	·10	·46	·64	41 08	35 0	32·8	47·33	35·03	45·56	35·72	9·84
August.....	·669	·07	·11	·96	40·23	55·2	30 9	49·53	35·63	44·79	34·61	10·18
Year.....	29·837	30·95	28·60	2·35	14·755	55·2	—38·1	49·53	— 34·52	19·42	9·06	10·36
September...	29·604	30·08	28·96	1·08	34·51	40·7	31·1	38·08	32·73	37·37	31·75	5·62

1885, to 15th September, 1886, inclusive.—Observer, J. W. TYRELL, Esq., P.L.S.

Pressure of Vapour.	Relative Humidity.	Dew Point.	Wind.			Cloudiness to Tenths.	Rain.		Snow.		Days Aurora Reported.
			Highest Velocity.	Highest Daily Mean.	Mean Hourly Velocity.		Depth in Inches.	Duration in Hours.	Depth in Inches.	Duration in Hours.	
·163	81	.....	60·	49 3	15·84	7·2	.....	.....	3·	13	5
·130	87	.....	43·	34·3	14·12	7·4	·1	10	1·	48	4
·079	76	.....	38·	33·0	16·02	6·1	.....	.....	7·	39	7
·047	87	.....	50·	41·0	17·15	6·1	.....	.....	14·	86	7
·015	.....	.....	50·	30·8	14·50	3 2	.....	.....	12·	48	3
·018	.....	.....	70·	38·0	14·29	3·3	.....	.....	9·	40	13
·033	.....	.....	46·	32·5	11·10	2·8	.....	.....	1·	8	11
·070	94	.....	48·	26·3	16 57	5.3	.....	.....	6·	30	16
·134	94	.....	44·	32·3	16·53	8·5	1·23	43	12·	52	7
·184	85	.....	45·	31·2	14·95	6·2	·18	15	3·	20	.....
·214	84	.....	36·	30·3	16·12	7·4	1·24	57	.....	.....	.....
·221	88	.....	38·	31·0	11·73	7·8	3·46	158	.....	.....	3
·109	87	.....	70·	49 3	14·91	5·94	6·21	283	68·	334	76
·179	88	.....	58·	52 0	19·52	8·4	·81	16	·75	12	3

TABLE IV.—Abstract of Observations taken at Stupart's Bay, Station No.

Months.	Barometer at 32°, Sea Level.				Temperature.							
	Mean.	Highest Obs.	Lowest Obs.	Range.	Mean.	Highest Obs.	Lowest Obs.	Mean of Warmest Day.	Mean of Coldest Day.	Mean Maximum.	Mean Minimum.	Range.
1885.												
September.....	.....	.....	.....	.....	33·32	46·9	4·8	37·8	24·9	36·04	26·95	9·09
October	29·768	30·337	29·393	·944	25·02	35·7	0.5	32·2	9·1	29·46	17·00	12·46
November.....	30·042	30·381	29·462	·919	15·45	27·8	—8·0	26·2	— 4·0	19·94	8·50	11·44
December	29·625	30·459	28·608	1·851	— 2·43	30·1	—28·5	23·5	—22·8	4·54	—10·13	14·67
1886.												
January	29·990	30·809	29·064	1·745	—21·48	10·9	—37·3	3·0	—32·7	—15·12	—27·80	12·68
February	29·807	30·900	28·724	2·176	—20·39	11·5	—39·5	2·0	—35·1	—14·91	—26·72	11·81
March.....	29·871	30·653	28·946	1·707	— 6·75	23·2	—31·8	13·0	—26·7	0·28	—15·06	15·34
April	29·959	30·487	29·513	·974	10·49	40·8	—18·9	29·6	—10·9	16·77	2·84	13·93
May.....	29·754	30·338	29·133	1·205	24·87	45·4	0·8	38·0	8·0	30·07	18·23	11·84
June	29·792	30·213	29·174	1·039	38·62	60·3	26·5	50·4	32·9	43·84	33·60	10·24
July	29·749	30·691	29·366	·725	41·28	68·0	30·5	51·9	34·0	48·55	35·06	13·49
August	29·655	30·070	29·093	·977	42·55	66·5	29·0	53·6	35·0	49·16	35·77	13·39
Year.....	.....	30·900	28·608	2·292	15·044	68·0	—39·5	53·6	—35·1	20·72	8·19	12·53
Sept'r, 15 days	29·593	30·070	28·971	1·099	35·97	50·4	21·4	39·3	31·9	41·00	31·64	9·36

4, 1st September, 1885, to 15th September, 1886.—Observer, F. F. PAYNE.

Pressure of Vapour.	Relative Humidity.	Dew Point.	Wind.			Mean Cloudiness in Tenths	Rain.		Snow.		Number of Auroras.	Duration of Fog in Hours.
			Highest Velocity	Highest Daily Mean.	Mean Hourly Velocity.		Duration in Hours	Depth in Inches	Duration in Hours.	Depth in Inches.		
·167	86·0	29·5	55	33·2	13·3	7·4	58	·35	86	11·4	9	57
·126	89·7	23·5	30	28·7	11·3	7·2	12	·15	110	28·6	11	13
·084	91·6	.....	30	24·8	13·4	6·4	.....	.....	105	23·0	5	.....
·045	97·3	.....	53	41·2	12·8	4·4	.....	.....	144	35·1	16	10
.....	.....	.....	50	32·2	12·7	3·9	.....	.....	95	10·2	13	60
.....	.....	.....	60	47·7	13·6	3·3	.....	.....	113	11·9	13	43
·034	93·4	.....	48	43·5	9·5	3·9	.....	.....	76	11·9	17	74
·072	90·7	.....	52	40·3	13·0	6·0	7	·26	139	11·3	8	35
·124	86·5	21·7	27	18·5	9·3	6·9	63	1·29	86	9·5	4	59
·189	81·6	32·9	40	32·0	11·6	6·1	62	1·15	45	7·5	.....	68
·218	84·2	36·4	25	15·5	4·6	7·0	19	·39	.....	.....	.....	147
·225	82·8	37·3	45	32·7	9·0	6·6	56	1·69	.....	.....	7	40
·1284	88·38	30·22	60	47·7	11·2	5·76	277	5·28	999	160·4	103	606
·173	81·7	30·8	50	38·2	12·4	7·0	30	1·27	3	·2	3	1

TABLE V.—Abstract of Observations taken at Port de Boucherville, Station No. 5,

Months.	Barometer, corrected, Sea Level.				Temperatures.						
	Mean.	Highest Obs.	Lowest Obs.	Range.	Mean.	Highest Obs.	Lowest Obs.	Mean of Warmest Day.	Mean of Coldest Day.	Mean Maximum.	Mean Minimum.
1885.											
September....	29·850	30·162	29·002	1·160	32·14	41·0	13·0	38·01	23·00	35·55	26·93
October	·847	·537	·317	1·220	23·04	32·8	— 2·2	30·93	3·83	26·24	17·59
November	30·150	·442	·812	0·630	14·46	27·3	— 9·9	25·82	— 9·22	18·93	8·06
December.....	29·683	·382	28·582	1·800	— 6·60	29·3	—32·8	18·30	—28·02	— 0·04	—14·73
1886.											
January.....	29·987	30·767	29·327	1·440	—24·43	8·0	—38·2	0·70	—35·02	—19·24	—30·90
February.....	·858	·842	28·990	1·852	—26·17	—2·6	—44·7	— 5·18	—40·05	—22·31	—33·08
March.....	·901	·642	29·131	1·511	—10·96	16·8	—38·1	12·46	—31·93	— 5·60	—18·76
April	30·044	·617	·532	1·085	6·22	28·1	—21·2	23·45	—13·20	11·73	—2·21
May.....	29·742	·342	·082	1·260	22·70	41·8	0·8	35·85	6·03	27·09	16·91
June...	·869	·332	·312	1·020	37·37	54·8	28·2	45·03	32·60	43·07	32·14
July	·740	·057	·415	0·642	39·07	59·7	32·1	45·45	34·77	45·23	34·39
August.....	·664	·070	28·932	1·138	39·07	60·3	31·2	44·46	34·55	45·08	34·54
Year.....	29·861	30·842	28·582	2·260	12·16	60·3	—44·7	45·45	— 40·05	17·14	5·91

1st September, 1885, to 1st September, 1886—Observer, Mr. JOHN MCKENZIE, C.E.

Range.	Pressure of Vapour.	Relative Humidity.	Dew Point.	Wind.			Cloudiness to Tenths.	Rain.		Snow.		Number of Days Auroras Reported.
				Mean Hourly Velocity.	Highest Daily Mean.	Highest Velocity.		Duration in Hours.	Depth in Inches.	Duration in Hours.	Depth in Inches.	
8·62	·1584	85·92	28·38	13·28	39·72	56·0	6·8	19·8	0·243	55·5	2·5	10
8·65	·1158	89·57	20·51	8·47	21·82	29·4	7·9	.....	.....	80·5	18·5	16
10·86	·0826	92·58	12 79	12·09	29·36	42·0	6·7	.....	.....	87·5	14·5	24
14·70	·0353	95·11	.....	11·80	26·65	41·6	5·9	.....	.....	203·1	30·5	13
11·66	·0131	.....	.....	12 03	32·40	45·5	4·2	.....	.....	77·5	11·0	16
10·76	·0111	.....	.....	8·73	46·95	70·0	4·4	.....	.....	71·0	5·0	19
13·16	·0304	.....	.....	11·67	28·85	35·5	4·8	.....	.....	56·5	6·0	15
13·94	·0604	92·93	.....	11·22	27·36	35·4	5·9	.....	.....	49·0	8·0	9
10·19	·1216	93·05	20·89	14·52	39·16	58·0	9·3	12·25	0 428	114·0	16·8	.....
10·93	·1824	82·17	32·13	9·51	21·83	33·0	6·3	31·00	0·492	14·6	.....	.....
10·84	·2003	84·73	34·59	10·92	21·32	30·0	7·7	72·30	1·786	*	.....	1
10·54	·2063	86·59	35·21	9·70	20·92	29·3	6·6	70·25	2·517	.....	.....	11
11·24	·1015	89·18	.....	11·162	46·95	70·0	6·375	205·6	5·466	809·2	112·8	134

* Only a trace of snow.

TABLE VI.—Abstract of Observations at Digge's Island, Latitude 62° 34·33
August, 1886.—Observer,

Months.	Barometer (corrected to Temp. 32° and to Sea Level.)				Temperatures.						
	Mean.	Highest.	Lowest.	Range.	Mean.	Highest.	Lowest.	Mean of Warmest Day.	Mean of Coldest Day.	Mean Max.	Mean Min.
1885.											
September....	29·7390	30·107	28·658	1·449	33·84	51·9	18·9	43·36	25·78	37·46	30·14
October.....	29·7503	30·466	29·187	1·279	25·44	36·7	5·9	34·71	14·06	28·43	21·86
November.....	30·0568	30·346	29·740	·606	16·52	27·7	— 8·7	25·91	— 6 05	20·54	11·37
December.....	29·6365	30·396	28·418	1·978	— 5·93	23·3	—31·1	20·20	—25·68	— 0·12	—11·18
1886.											
January	29·9979	30·752	29·436	1·316	—25·39	5·4	—37·6	— 0·91	—35·68	—20·50	—31·08
February	29·8615	30·847	29 008	1·839	—25·49	2·9	—40·4	— 1·88	—36·38	—21·24	—31·09
March	29·8838	30·674	29·097	1·577	—10·77	21·6	—38·3	15·51	—34·16	— 4·96	—17·46
April.....	30·0141	30·638	29·408	1·230	7·48	30·4	—19·0	25·01	—12·10	13·66	0·62
May	29·7088	30 395	29·062	1·333	22·85	39·4	0 9	34 81	6·30	27·87	17·62
June.....	29·8484	30·365	29·177	1·188	35·86	49·5	27·9	39 71	31·95	40·27	31·15
July	29·7068	30·066	29·344	·722	40·09	60 8	29·7	53·78	33·18	46·05	34·14
August.....	29·6448	30·102	28·786	1·316	39·26	54·9	31·3	44 45	35·31	43·91	34·82
Year	29·82072	30·847	28·418	2·429	12·81	60·8	—40·4	53·78	36·38	17·61	7·57

North, Longitude 78° 1′ West, Station No. 6, 1st September, 1885, to 31st
P. C. Woodworth.

Range.	Pres e of Vapour.	Relative Humidity.	Dew Point.	Wind.			Cloudiness to Tenths	Rain.		Snow.		No. of Days Auroras Reported	Fog.
				Mean Hourly Velocity.	Highest Daily Mean.	Highest Velocity.		Duration in Hours.	Depth in Inches.	Duration in Hours	Depth in Inches.		Duration in Hours.
7·32	·1696	85·16	29·87	18·24	40·50	53	7·33	3	·030	58	12	5	80
6·56	·1240	86·93	22·22	13·22	29·33	37	8·38	.....	.....	77	15	4	12
9·17	·0868	89 91	14·94	17·28	42·33	49	6·91	.....	.....	40	2½	12	28
—11·05	·0348	89·26	.....	19·22	43·66	48	6·84	.....	.....	57	11⅓	8	.....
—10·58	.....	.....	.....	15·88	32·66	43	4·14	.....	.....	5	1	20	*
— 9·58	.....	.....	.....	13 77	35·50	44	4·46	.....	.....	19	5	14	*
—12·50	.....	.....	.....	16·11	35·83	48	5·01	.....	.....	95	16	17	*
13·02	.....	.....	.....	13·91	26·33	40	7·13	.....	.....	94	12	7	16
10·24	·1210	93·99	21·40	18 90	40·33	58	9·49	.....	.....	132	36	.....	76
9·12	·1852	88·28	32·51	9·82	25·16	30	6·96	28	·590	.....	.....	.....	124
11·91	·2246	89 69	37·06	10·83	30·50	40	8 27	90	3·480	.....	.....	.....	188
9·09	·2203	91·81	36·91	12·36	38·33	48	7·11	44	2·420	.....	.....		208
10·03	.....	.....	.....	14 96	43·66	58	6·83	165	6·520	577	111	94	740

* A great deal of vapour around horizon for January and February.

Table VII.—Abstract of Meteorological Observations at Fort Churchill, Hudson Bay, Lat. 58° 43' N., Long. 94° 10' W., from September, 1885, to 14th August, 1886, inclusive.—Observer, John B. Spencer.

Months.	Barometer at 32°.				Temperature.					Average Pressure of Vapour.	Average Relative Humidity.	Wind.					Rain.		Snow.		No. of Fogs.	No. of Auroras	No. of Thunder Storms.	Average Cloudiness.
	Average.	Highest.	Lowest.	Range.	Average.	Highest.	Lowest.	Average of Warmest Day.	Average of Coldest Day.			Prevailing Direction.	Total Mileage.	Average Hourly Velocity.	Average of most Windy Day.	Average of least Windy Day.	Amount.	Days.	Amount.	Days.				
1885.					°	°	°	°	°															
September...	29·678	30·144	29·153	0·991	39·37	60·5	29·0	51·17	30·50	0·208	85	E.....	8,169	12·61	24·67	2·92	6·18	20	0·5	2	4	1	...	9·5
October	29·914	30·347	29·256	1·091	23·66	53 0	— 4·0	38·00	— 2·67	·109	79	N.W.....	8,508	13·13	30·71	1·13	0·55	3	4·0	7	2	4	1	8·7
November ...	30·013	30·406	29·467	0·889	16·49	33·0	—17·0	28·00	—10·67	·081	80	N.E.-S.W..	3,783	5·98	19·09	0·38	R	1	22·5	5	9	5	..	7 6
December ...	29·857	30·456	28 918	1·538	— 8·26	39·0	—36·0	31·33	—32·00	.....	.....	N.W.....	8,873	11·93	39·75	1·17	R	1	5·0	6	4	3	...	7·8
1886.																								
January.....	30·156	30 820	29·702	1·118	—27·64	9·0	—45·0	—2·00	—41·67	.....	.....	N.W..	5,969	8·02	24·29	0·00	.....	...	.....	...	3	12	...	3·1
February	30·125	30 658	29·098	1·560	—20·68	7·0	—39·0	—4·33	—55·00	.....	.....	N.W.....	4,615	6·87	35·08	0·17	.....	...	2·5	3	0	7	...	2·9
March	30·045	30·581	29·263	1·318	— 8·40	29·9	—37·0	20·33	—32·67	.....	.....	N.W.-S.E.	5,972	8·03	27·46	0·00	.....	...	3 5	2	0	9	...	3·8
April	30·085	30·550	29 285	1·265	16·41	44·0	—16·0	33·00	—12·00	·078	72	N.W.-E....	5,141	9·31	23·25	0·83	0·27	4	9·0	1	2	4	...	6·4
May.....	29·903	30·433	29·170	1·263	24·38	52 1	— 2·0	35·67	3·00	·114	78	N.W.-E....	8,456	11·37	32·04	0·88	0·52	2	1 4	6	0	0	..	8·1
June	29·908	30·237	29·382	0·855	43·07	82·0	30·0	71·67	33 33	·277	91	E.-N.W...	3,942	5.48	12·96	0·42	1·32	8	5·0	5	3	0	3	5·1
July.	29·771	30·203	29·209	0·994	56 94	80·(	40·0	66·33	43·33	·368	83	N W.-N.E.	3,584	5·15	15·63	0·83	2·36	19	.....	...	1	0	5	6·2
Aug. to 14th	29·853	30·173	29·609	0·564	52·06	74·0	40·0	65·77	43·33	·299	75	N.W.-N....	.....	8·10	12·83	4·17	0 32	7	.....	...	2	1	2	6 4
Year.	.....	.....	.....	.....	....	.....	....	.....	....	.....	.....	....	.....	.....	.....	.....	.....	...	.....	..	...	...	...	.....

TABLE VIII.—Mean daily temperature, October, 1885, to March, 1886, at Fort Chimo, Labrador, Latitude , Longitude , from observations at 7 a.m. and 8 p.m., with the monthly average, and the highest and lowest from the observed readings, advantage being taken of occasional observations at 2 p.m. daily.

Day.	October.	November.	December.	January.	February.	March.
	°	°	°	°	°	°
1	35·0	7·5	— 2·0	— 9·0	5·0	27·5
2	35·0	3·0	17·5	— 8·5	—20·0	25·0
3	33·5	5·0	7·5	5·0	—23·5	20·0
4	33·5	12·5	— 7·5	1·0	—29·0	12·5
5	31·0	16·0	—10·0	—16·0	—26·0	9·5
6	31·0	21·5	— 9·0	—26·0	—29·5	6·0
7	28·5	22·0	— 6·0	—15·5	—27·5	0·0
8	26·5	23·0	— 7·0	—14·5	—39·0	—13·0
9	28·5	22·5	— 7·0	—21·0	—37·5	—21·5
10	30·5	18·5	— 7·0	—15·5	—33·0	— 5·0
11	32·0	31·0	—10·0	—15·0	—31·0	—30·0
12	23·0	33·0	—10·0	—23·5	16·5	—35·5
13	20·5	32·0	—12·0	—26·0	19·0	—35·5
14	32·0	19·0	— 4·0	—26·5	25·0	—36·5
15	36·0	32·0	—10·0	—26·0	—17·5	—36·5
16	35·0	28·5	— 9·5	—20·0	—16·5	—14·0
17	35·5	26·0	—13·0	—17·5	—16·5	—11·0
18	38·0	21·0	—18·0	— 9·5	—29·0	— 5·0
19	38·0	18·0	—18·0	—21·0	—30·0	— 9·0
20	35·0	11·0	—19·0	—19·0	—38·0	— 1·0
21	31·5	12·5	—18·0	—29·5	—39·0	0·0
22	30·0	6·5	—20·0	—26·0	—37·5	— 1·0
23	29·5	9·0	—22·5	2·0	—37·0	— 3·0
24	29·0	17·5	—26·0	—26·0	—32·5	— 2·0
25	25·0	2·5	—27·5	—30·5	—34·0	0·5
26	23·5	7·5	—18·0	—32·0	14·5	— 7·5
27	19·5	17·5	—26·0	—32·0	— 7·0	—16·0
28	23·0	— 0·5	— 6·0	—26·5	— 5·0	—11·5
29	21·5	—11·0	— 9·0	—34·5	.....	— 7·5
30	10·7	— 7·5	.....	—37·5	.....	0·0
31	9·0	.....	.....	6·5	.....	16·0
Average	28·7	15·2	—11·3	—18·9	—19·3	— 4·3
Highest	41·0	36·0	20·0	10·0	28·0	34·0
Lowest	8·0	—16·0	—28·0	—39·0	—43·0	—37·0

TABLE IX.—Mean Temperature for each Month, Quarter and Year from three series of Observation: (1st) September, 1842 to December, 1854, inclusive; (2nd) January, 1864, to April, 1868, inclusive; (3rd) January, 1876, to February, 1883, inclusive, with the Monthly, Quarterly and Annual Average for each period.

NOTE.—The observations in the two first groups were made at 8 a.m., 2 p.m. and 8 p.m., and in the latter at 7 a.m., 2 p.m. and 9 p.m.

Years.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Winter.	Spring.	Summer.	Autumn.	Year.
	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°
1842	.....	.....	.....	.....	.....	.....	....	.....	43·75	28·53	9·12	— 3·77	.....	.....	.....	27·13	.....
1843	— 9·58	—21·67	— 9·00	17·64	26·33	42·12	55·76	56·57	40·80	20·05	9·56	— 3·93	—11·67	11·66	51·48	23·47	18·72
1844	—24·90	— 8·14	—10·61	22·06	28·41	39·28	54·68	49·98	41·34	26·92	3·06	— 8·10	—12·32	13·29	47·98	23·77	17·83
1845	—12·60	— 8·55	— 5·62	19·52	27·45	42·61	54·37	56·89	42·80	23·06	11·01	—13·30	— 9·75	13·78	51·29	25·62	19·81
1846	— 0·13	—17·28	6·29	11·72	34·56	57·18	59·80	55·20	39·99	25·01	14·76	— 5·97	—10·24	17·52	57·39	26·59	23·43
1847	—20·75	— 8·33	— 7·54	14·13	30·19	49·66	61·47	54·01	44·77	28·31	9·29	— 9·82	—11·68	12·26	55·05	27·46	20·45
1848	—19·64	— 4·96	— 4·47	22·34	30·01	42·84	55·57	50·41	38·79	28·33	9·54	—16·06	—11·47	15·96	49·61	25·55	19·39
1849	—16·19	—19·82	— 0·21	3·97	31·81	41·99	58·80	52·01	40·53	31·88	20·01	—17·82	—17·36	11·86	50·93	30·81	18·91
1850	—14·70	— 3·76	0·85	10·90	28·26	51·83	57·81	55·12	43·52	28·47	16·82	—13·13	—12·09	13·34	54·92	29·60	21·83
1851	—15·90	—16·02	2·50	17·00	29·44	43·94	55·56	49·98	45·40	30·65	11·60	— 8·79	—15·02	16·31	49·83	29·22	20·45
1852	—12·67	— 8·27	— 7·18	24·53	34·72	46·10	56·70	53·99	38·74	23·72	11·58	—17·25	— 9·91	17·36	52·26	24·68	20·93
1853	— 6·13	—18·63	— 0·83	14·41	29·49	42·47	60·79	55·39	42·76	31·09	— 5·69	—11·69	—14·00	14·36	52·88	22·72	19·45
1854	—27·17	—22·30	— 5·25	18·75	32·05	54·91	56·18	51·47	39·95	28·50	3·88	—17·29	—20·39	15·18	54·19	24·11	17·80
Average, 8 a.m., 2 p.m. and 8 p.m.	—15·03	—13·14	— 3·42	16·41	30·23	46·24	57·29	53·42	41·78	27·27	9·58	—11·30	—13·16	14·41	52·32	26·21	19·92
Average, 8 a.m. & 8 p.m.	—16·30	—15·30	— 6·32	13·90	28·11	44·03	54·94	51·29	39·89	25·76	8·52	—12·13	—14·58	11·90	50·09	24·72	18·03
1864	—12·92	— 8·02	—10·18	19·81	31·86	47·83	57·47	54·22	41·82	27·74	10·40	—18·57	.....	15·83	53·17	26·65	20·12
1865	—14·12	— 4·98	3·16	11·99	29·55	44·54	55·40	52·94	43·93	29·89	17·99	—16·31	—12·56	14·90	50·93	30·60	20·98
1866	—10·89	—18·23	— 8·08	15·50	30·76	41·43	60·70	55·12	40·40	27·68	14·04	— 4·05	—15·14	12·73	52·42	27·37	19·35
1867	—12·86	—17·21	— 2·88	11·42	30·67	44·40	58·96	57·67	44·18	32·72	0·58	—16·69	—11·37	13·07	53·68	25·83	20·30
1868	—14·03	—18·93	3·82	3·73	.....	.....	.....	.....	.....	.....	.....	.....	—16·55	.....	.....	.....	.....
	—12·96	—13·47	— 2·83	12·49	30·71	44·55	58·13	54·99	42·58	29·51	10·75	—13·90	—13·44	13·46	52·56	27·60	21·72

1876	—16·40	—20·20	—11·70	21 00	38·30	49·10	56·60	55·60	46 00	26·60	1·40	—12·20	.....	15·87	53·77	24·67	19·49
1877	—19·50	0·80	—10·90	21·80	43·00	43·96	61·22	54·27	44·59	29·85	15·02	— 4·62	—10·30	17·97	53·15	29·82	23·22
1878	— 6·92	2 78	10·24	26·66	33·11	64·89	73 80	58·81	37·50	21·91	17 78	— 6·50	— 2·92	23 34	65·83	25·73	27·8
1879	—23·56	—28·90	—11·85	19·37	34·67	57·55	59·22	51·02	43·80	29·27	6·04	—27·18	—19·65	14·06	55·93	26·37	17·48
1880	—23·84	—23·43	—10·73	10 83	31·94	51·37	58·53	49·00	38 50	24·99	1 72	—18·93	—24·82	10·68	52·97	21·71	16·3
1881	—27·72	—17·66	— 0·98	16·54	34·94	56·80	66·47	54·17	41·20	22·80	— 2·60	—12·04	—21·44	16·83	59·15	20·47	19·54
1882	—27·26	—13·20	— 9·47	18·85	35 09	51·78	68·24	54·51	44·81	37·70	12·89	—11·13	—17·50	14·82	58·18	31·80	21·90
1883	—25·34	—19·78	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	—18·75	.....	.....	.....	.....
	—20·74	—14·26	— 6·48	19·36	35·86	53·64	63·30	53·91	42·33	27·60	7·46	—12·23	—16·08	16·25	56·95	25·80	20·7

YORK FACTORY, HUDSON BAY.

TABLE X.—Mean Temperature of each Month and Year, from 1842 to 1854, at 8 a.m.

Years.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Year.
	°	°	°	°	°	°	°	°	°	°	°	°	°
1842.....	.....	.....	.....	.....	.....	.....	.....	.....	37·87	24·92	9·00	— 4·82	.....
1843.....	—12·69	—26·57	—16·05	10·27	22·21	37·03	50·69	50·15	36·43	17·69	7·17	— 6·76	14·13
1844.....	—28·11	—11·43	—17·63	15·37	24·18	36·13	50·60	46·92	37·07	23·15	0·50	— 9·85	13·91
1845.....	—14·73	—13·71	—12·60	14·43	23·98	40·03	50·15	51·02	39·90	20·11	9·57	—16·85	15·94
1846.....	— 1·76	—22·18	1·37	9·07	33·40	54·67	56·69	50·92	35·63	22·44	14·20	— 7·66	20·57
1847.....	—23·73	—11·79	—14·34	12·63	27·98	44·17	57·76	48·15	40·57	25·47	7·80	—11·24	16·95
1848.....	—21·85	— 7·81	— 9·95	18·23	27·05	40·40	51·69	45·34	35·57	25·18	8·00	—17·60	16·19
1849.....	—19·34	—24·89	— 6·56	2.05	29·60	39·57	56·85	47·73	37·13	30·34	19·67	—20·82	15·94
1850.....	—17·27	— 7·14	— 5·53	9·67	26·40	50·90	57·18	55·44	40·33	27·05	15·67	—15·08	19·80
1851.....	—19·79	—18·64	— 3·11	13·83	27·66	41·83	52·89	47·15	42·83	28·31	9·70	— 9·53	17·76
1852.....	—14·63	—12·88	—12·89	22·63	33·53	44·95	55·18	51·89	36·73	22·15	10·90	—18·44	19·93
1853.....	— 8·02	—23·75	— 5·60	10·87	27·15	41·53	59·40	54·63	40·83	27·95	—8·40	—13·47	16·93
1854.....	—30·18	—26·54	—11·56	15·57	32·27	55·50	56·89	51·03	36·83	26·87	2·60	—18·44	15·90
Average	—17·67	—17·28	— 9·54	12·89	27·95	43·87	54·66	50·03	38·29	24·74	8·18	—13·12	17·00

TABLE XI.—Mean Temperature, 2 p.m.

1842.....	.....	.....	.....	.....	.....	.....	.....	.....	49·00	31·27	10·07	— 3·37	.....
1843.....	— 7·56	—19·29	— 3·76	23·13	31·18	49·00	63·82	63·40	45·07	22·85	11·40	— 2·31	23·08
1844.....	—22·53	— 4·74	— 4·50	29·03	33·27	44·03	59·37	53·92	45·37	30·98	5·30	— 6.66	21·90
1845.....	—10·66	— 3·93	0·31	25·13	33·40	47·30	59·89	60·53	46·13	26·02	12·63	—10·89	23·82
1846.....	1·76	—12·61	11·60	16·40	39·02	62·13	64·08	60·69	44·43	27·92	17·30	— 4·44	27·36
1847.....	—18·53	— 2·39	— 1·50	17·80	34·73	55·73	66·37	60·18	49·07	31·85	11·57	— 7·92	24·75
1848.....	—17·27	— 1·29	0·98	27·47	34·60	46·80	60·21	55·37	42·13	31·34	11·90	—14·34	23·16
1849.....	—12·89	—15.29	6·18	8·84	36·60	46·57	62·76	56·18	43·93	34·79	21·73	—15·24	22·85
1850.....	—11·18	0·53	7·60	14·10	31·69	55·10	61·05	57·15	46·70	30·76	19·60	—10·82	25·19
1851.....	—12·79	—12·54	8·31	22·50	33·15	48·00	60·82	53·31	48·43	33·76	14·07	— 7·47	24·13
1852.....	—10·05	— 3·29	— 2·53	29·40	38·19	49·67	61·18	58·57	41·90	26·47	13·43	—15·24	23·93
1853.....	— 4·02	—13·64	4·66	20·13	33·60	45·50	64·47	59·21	45·93	34·95	—2·80	—10·50	23·12
1854.....	—24·08	—17·46	1·11	23·37	34·18	58·23	59·85	53·63	44·03	30·90	5·77	—16·39	21·10
Average	—12·48	— 8·83	2·37	21·44	34·47	50·67	61·99	57·68	45·55	30·30	11·69	— 9·66	23·70

YORK FACTORY, HUDSON BAY.

TABLE XII.—Mean Temperature at 8 p.m.

Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Year.
	°	°	°	°	°	°	°	°	°	°	°	°	°
1842.....	.....	.....	.....	.....	.....	.....	.....	.....	44·37	29·40	8·20	— 3·11	.....
1843.....	— 8·50	—19·14	—7·18	19·53	25·60	40·33	52·76	56·15	40·90	19·60	10·10	— 2·73	18·95
1844.....	—24·05	— 8·26	—9·69	21·77	27·79	37·67	54·08	49·11	41·57	26·63	3·37	— 7·79	17·68
1845	—12·40	— 8·00	—4·57	19·00	24·98	40·50	53·08	59·11	42·37	23·05	10 83	—12·15	19·65
1846.....	— 0·40	—17·04	5 89	9·70	31·27	54·73	58 63	53·98	39·90	24·66	12·77	— 5·82	22·36
1847.....	—19 98	—10·82	—6 79	11·97	27·85	49 07	60·27	53·69	44·67	27·60	8·50	—10·31	19·64
1848.....	—19·79	— 5·78	—4·44	21·33	28·37	41·33	54·82	50·53	38·67	28·47	8·73	—16·24	18·83
1849.....	—16·34	—19 29	—0 24	1·02	29·24	39 83	56·79	52·11	40·53	30·50	18·63	—17·40	17·95
1850.....	—15·66	— 4·68	0·47	8·93	26·69	49·50	55·21	52·76	43·53	27·60	15 20	—13·50	20·50
1851.....	—15·11	—16 89	2·31	14·67	27·50	42·00	52·98	49·44	44·93	29·89	11·03	— 9·37	19·45
1852.....	—13 34	— 8 64	—6·11	21 57	32·43	43·67	53·73	51·50	37 60	22·53	10·40	—18·08	18·94
1853.....	— 6·34	—18·50	—1·56	12·23	27·73	40·37	58·50	52·34	41·53	30·37	—5·87	—11·11	18·31
1854.....	—27·24	—22·89	—5·31	17·30	29·69	51·30	51·79	49·76	38·98	27·74	3·28	—17 05	16·45
	—14·93	—13·33	—3·10	14 92	28·26	44·19	55·22	52·54	41·50	26·67	8·87	—11·13	19 06

TABLE XIII.—Average difference without regard to sign between the Mean Temperature of each Month and Year, and the monthly and annual averages of each group as given in Table.

—	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Year.
	°	°	°	°	°	°	°	°	°	°	°	°	°
1842 ..... 1854	5·7	6·1	3·7	4·5	2·0	4·8	2·0	2·2	1·9	2·7	4·4	4·2	1·25
1864 ..... 1868	0·9	5·4	4·3	4·1	0·6	1·6	1·7	1·4	1·5	1 8	5·3	4·9	0·57
1876 ..... 1883	4·2	8·1	4·5	3·3	2·8	5·5	5·2	2·2	2·8	4·0	6·7	5·6	3·28

YORK FACTORY, HUDSON BAY.

TABLE XIV.—Highest Temperature in each Month and Year from Observations made in the following groups of years.

(In the two first groups the entries are from the ordinary observation hours.)

Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Year.
	°	°	°	°		°	°	°	°	°	°	°	°
1842.....	.....	.....	.....	.....	.....	.....	.....	.....	60·5	45·5	36·5	15 5	.....
1843	23·5	8·5	17·5	46 5	53·5	77·5	80·5	85·5	68·5	44·5	27 5	28·5	85·5
1844.....	2·5	31·5	13·5	53·5	57·5	73·5	76·5	67·5	57·5	60·5	33·5	15·5	76·5
1845.....	18·5	29·5	33 5	46·5	77·5	77 5	77·5	88·5	63·5	47·5	37·5	13·5	88·5
1846	21·5	7·5	35·5	46·5	71·5	80 5	79·5	77·5	54·5	47·5	41·5	13·5	80·5
1847.....	11·5	13 5	22·5	42·5	57 5	79·5	90·5	73·5	66 5	48·5	31·5	15·5	90·5
1848.....	16 5	29 5	33·5	48·5	58·5	74·5	84·5	73·5	60·5	54·5	29·5	14·5	84·5
1849.....	13·5	3·5	34·5	44·5	71·5	69·5	87·5	73·5	63·5	54·5	40·5	18 5	87·5
1850.....	24·5	31 5	36 5	45·5	53·5	76·5	80·5	77·5	78·5	51 5	41·5	13 5	80·5
1851.....	18·5	13·5	41·5	47 5	58·5	79·5	77·5	71·5	64·5	45·5	30·5	8.5	79·5
1852.....	18·5	26 5	15·5	39·5	55·5	71·5	80·5	75·5	54·5	43·5	29·5	22·5	80·5
1853.....	20·5	18·5	33.5	43·5	60·5	76·5	85·5	73·5	57·5	53·5	18·5	27·5	85·5
1854.....	— 0·5	2·5	30·5	45·5	65·5	83·5	76·5	77·5	70·0	44·5	27·5	9·5	83·5
Mean.	15·8	18·0	29·0	45·8	61·7	76 7	81·4	76·3	63·1	49·4	32·7	16·7	83·6
1864.....	26 5	29·5	14·5	45·5	46·5	80·5	86·5	74 5	64·5	37·5	34·5	14·5	86·5
1865	13 5	20·5	44·5	52·5	69·5	78·5	86·5	87·5	63·5	52·5	36·5	10·5	87·5
1866	30·5	12·5	29 5	47·5	61·5	84·5	94·5	82·5	60 5	61·5	34·5	22·5	94·5
1867.....	17·5	22·5	50·5	44·5	54·5	74 5	84·5	78·5	74·5	38·5	35·5	10·5	84·5
1868.....	4 5	14·5	48·5	34·5	.....	.....	.....	.....	.....	.....	.....	.....	.....
Mean..	18·5	19·9	37·5	44·9	58·0	54·5	88 0	80·7	67·0	48·2	35·3	14·5	88·2
1875.....	— 4 0	— 1·0	29·5	43·5	71·0	79·0	78·0	76·5	66·0	43·0	35·5	22·0	79·0
1876	22·0	17 0	24 0	54 0	78·0	79·0	99·0	86·0	74·0	42·0	35·0	24·0	99·0
1877.....	20·0	44·0	36·0	54·0	82 0	91·0	104·0	82·0	83·0	57 0	38·0	32 0	104·0
1878.....	26·5	40·0	36·0	53·5	75·0	100·5	106·0	91·5	60·2	38·2	35·0	29·0	106·0
1879.....	0·0	— 1·5	24·0	50·0	71·0	101·0	102·0	86·0	65·0	45·0	34·0	5·0	102·0
1880.....	1·5	2 0	40·0	46·0	60·0	99·5	100·0	81·0	66·0	40·0	30·0	— 6·0	100·0
1881.....	— 8·0	12 0	35·0	37·0	70·0	99·0	100 0	98·0	59·7	39·8	34·0	25·0	100·0
1882.....	0·0	41·0	31·0	42·0	81·0	95·0	99·0	80·0	73·0	56·0	33·0	15 0	99·0
1883.....	0·0	9·0	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Mean.	6·4	18·1	31·9	47·5	73·5	93·0	98·5	85·1	68·4	45·1	34·3	18·3	98·6

YORK FACTORY, HUDSON BAY.

TABLE XV.—Lowest Temperature in each Month and Year from observations made in the following groups of years.

(In the two first groups the entries are from the ordinary observation hours.)

Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Year.
	°	°	°	°	°	°	°	°	°	°	°	°	°
1842	.....	.....	.....	.....	.....	.....	.....	.....	23·5	6·0	—21·5	—36·5	.....
1843	—36·5	—41·5	—37·5	—13·5	— 0·5	22·5	36·5	36·5	22·5	— 6·5	—21·5	—37·5	—41·5
1844	—46·5	—36·5	—32·5	—11·5	4·5	26·5	30·5	38·5	28·5	— 6·5	—32·5	—30·5	—46·5
1845	—39·5	—46·5	—40·5	—17·5	— 1·5	25·5	38·5	38·5	30·5	5·5	—30·5	—36·5	—46·5
1846	—29·5	—39·5	—26·5	—18·5	12·5	28·5	41·5	37·5	28·5	4·5	—21·5	—36·5	—39·5
1847	—48·5	—33·5	—35·5	—11·5	16·5	27·5	38·5	33·5	32·5	— 4·5	—33·5	—34·5	—48·5
1848	—19·5	—31·5	—33·5	—21·5	10·5	26·5	36·5	36·5	24·5	11·5	—29·5	—35·5	—35·5
1849	—33·5	—45·5	—29·5	—19·5	1·5	28·5	36·5	33·5	29·5	9·5	—24·5	—40·5	—45·5
1850	—38·5	—37·5	—38·5	—12·5	13·5	31·5	41·5	29·5	27·5	5·5	—14·5	—32·5	—38·5
1851	—38·5	—32·5	—26·5	—15·5	3·5	24·5	36·5	38·5	31·5	4·5	—18·5	—38·5	—38·5
1852	—31·5	—33·5	—29·5	— 0·5	19·5	28·5	38·5	38·5	21·5	1·5	—13·5	—41·5	—41·5
1853	—37·5	—21·5	—31·5	— 9·5	8·5	29·5	36·5	38·5	28·5	8·5	—32·5	—34·5	—37·5
1854	—47·5	—42·5	—32·5	—12·5	6·5	31·5	40·5	37·5	26·5	8·5	—33·5	—39·5	—47·5
Mean.	—37·3	—36·8	—32·8	—13·7	7·9	27·6	37·7	36·4	27·4	2·5	—27·2	—38·7	—42·25
1864	—36·5	—49·5	—30·5	— 3·5	6·5	28·5	36·5	40·5	27·5	5·5	—16·5	—42·5	—49·5
1865	—42·5	—38·5	—31·5	—25·5	5·5	26·5	34·5	37·5	31·5	—0·5	—15·5	—37·5	—42·5
1866	—37·5	—41·5	—36·5	—11·5	16·5	25·5	34·5	38·5	27·5	—5·5	—18·5	—34·5	—41·5
1867	—39·5	—43·5	—41·5	—11·5	0·5	28·5	36·5	39·5	28·5	2·5	—38·5	—36·5	—43·5
1868	—37·5	—39·5	—28·5	—22·5	.....	.....	.....	.....	.....	.....	.....	.....	.....
Mean.	—38·7	—42·5	—33·7	—14·9	7·3	27·2	35·5	39·0	28·8	0·5	—22·2	—37·8	—44·25
1875	—44·5	—41·0	—38·0	—22·5	9·0	30·0	40·0	40·0	28·0	8·0	—40·0	—40·5	—44·5
1876	—48·0	—53·0	—46·0	—16·5	—15·5	27·0	39·5	29·0	28·0	8·0	—25·5	—38·0	—53·0
1877	—45·0	—32·0	—36·0	—22·0	— 8·5	26·0	38·0	31·5	24·0	10·0	—14·0	—28·5	—45·0
1878	—33·0	—27·0	—18·5	3·5	10·5	25·0	46·0	38·0	26·0	— 2·0	—15·0	—28·0	—33·0
1879	—43·0	—48·0	—40·5	—21·0	19·5	32·0	43·0	36·0	31·0	0·0	—16·0	—28·0	—48·0
1880	—49·0	—48·0	—48·0	—21·0	4·0	26·0	37·0	36·0	27·0	2·0	—37·5	—50·5	—50·5
1881	—51·0	—38·0	—27·0	—11·0	4·0	27·0	38·0	33·0	28·0	1·0	—32·0	—32·0	—51·0
1882	—49·0	—49·0	—31·0	—18·0	0·0	30·0	46·0	40·0	31·0	14·0	—18·0	—34·0	—49·0
1883	—52·0	—45·0	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Mean.	—46·1	—42·3	—33·1	—16·1	2·9	27·9	40·9	35·4	30·4	5·1	—24·8	—34·9	—46·75

TABLE XVI.—Port Burwell

Months.	Observations.	Calms.	N.		N.N.E.		N.E.		E.N.E.		E.		E.S.E.		S.E.	
			Number.	Average Velocity.	Number.	Average Velocity.	Number.	Average Velocity.	Number.	Average Velocity.	Number.	Average Velocity.	Number.	Average Velocity.	Number.	Average Velocity.
1885.																
October	186	18	7	13·	5	13·20	13	18·70	8	25·38	23	11·39	8	4·87	4	3·50
November	180	41	4	7·25	3	1·66	22	11·36	12	27·42	6	25·66	—	—	3	4·33
December	186	28	11	7·82	—	—	7	11·71	5	13·40	14	19·50	—	—	9	11·56
1886.																
January	186	22	15	31·	—	—	11	29·10	5	28·	19	29·	1	5·00	1	3·00
February	168	33	2	26·50	—	—	8	26·25	8	19·	28	33·25	1	40·	2	6·50
March	186	39	3	4·	—	—	30	10·10	18	9·17	16	21·62	—	—	—	—
April	180	27	11	17·18	—	—	15	33·93	9	38·66	19	24·16	—	—	2	3·50
May	186	28	5	14·40	1	3·	3	13·	7	15·57	44	24·90	2	20·	5	5·80
June	180	29	14	26·	—	—	4	35·75	9	35·55	19	34·53	—	—	3	5·66
July	186	33	3	20·	—	—	8	11·33	3	18·33	55	38·11	9	27·77	6	13·83
August	186	43	3	30·	1	50·	4	40·	9	42·22	19	22·58	2	9·	6	4·50
September	154	19	10	25·40	1	2·	6	4·33	1	4·	21	26·43	—	—	9	10·55
Year	2164	360	88	20·05	11	15·54	131	19·05	94	24·17	283	25·58	23	17·04	50	8·10

Station No. 1—Wind Table.

S.S.E.		S.		S.S.W.		S.W.		W.S.W.		W.		W.N.W.		N.W.		N.N.W.	
Number.	Average Velocity.	Number.	Average Velocity.	Number.	Average Velocity.	Number.	Average Velocity.	Number.	Average Velocity.	Number.	Average Velocity.	Number.	Average Velocity.	Number.	Average Velocity.	Number.	Average Velocity.
4	12·75	6	10·17	2	1·00	22	17·34	10	9·90	16	12·31	12	13·58	23	10·61	5	13·20
3	2·66	—	—	—	—	2	10·	2	2·00	10	18·60	9	17·89	50	13·88	13	7·54
—	—	5	9·40	7	17·57	61	17·96	10	12·70	6	10·83	4	29·50	14	22·21	5	20·20
—	—	8	19·12	2	14·	56	30·73	14	40·85	13	24·39	6	13·66	13	16·	—	—
1	8·	7	9·71	6	8·50	46	24·82	13	40·39	4	25·50	4	21·50	4	27·25	1	50·00
1	5·	10	18·30	5	27·60	43	26·88	11	33 82	10	25·10	—	—	—	—	—	—
2	3·	1	6·	3	5·66	28	21·04	5	16·	22	23·70	11	20·	21	15·90	4	20·
—	—	6	4·33	1	5·	30	17·70	8	19·88	15	16·60	8	13·	21	17·48	2	18·
2	5·	18	4·28	4	6·50	36	7·60	15	7·26	15	17·73	6	18·50	5	19·60	1	30·
7	10·	11	3·64	5	7·	14	8·93	3	7·66	10	11·	1	5·	8	17·88	10	9·20
6	3·50	10	4·40	5	16·20	36	16·47	6	3·17	15	17·40	7	3·71	6	4·17	8	6·25
—	—	5	5·60	—	—	28	29·46	8	34·62	18	29·39	5	18·40	21	20·43	2	13·
26	6·88	87	8·43	40	12·65	402	21·02	105	24 45	154	18·40	73	16·00	186	16·	51	12·33

TABLE XVII.—Ashe Inlet—

Months.	Observations.	Calms.	N.		N.N.E.		N.E.		E.N.E.		E.		E.S.E.		S.E.	
			No. Observations.	Average Velocity.	No. Observations.	Average Velocity.	No. Observations.	Average Velocity.	No. Observations.	Average Velocity.	No. Observations.	Average Velocity.	No. Observations.	Average Velocity.	No. Observations.	Average Velocity.
1885.																
September..	180	10	12	8 73	3	7·00	5	7·00	5	6 60	17	9·53	10	8·40	25	16·80
October	186	7	21	10·24	7	12·86	30	13·60	11	9·36	5	11·80	7	10·26	12	17·25
November...	180	6	35	15 03	15	12·06	50	10·78	13	9·77	21	13·50	2	16·50	8	22·00
December...	186	7	28	17·29	19	15·68	29	8·41	9	9·44	10	15·00	2	24·00	10	28·00
1886.																
January.....	186	4	29	18·00	22	24·64	26	9·23	11	5·05	17	7·35	2	29·00	10	16·50
February ...	168	26	39	22·05	34	19·41	18	8·83	6	5·02	10	7·30	—	—	4	11·25
March	186	35	10	14·10	24	14·79	48	6·75	10	5 80	2	8·00	2	18·00	2	11·50
April.....	180	9	19	13·16	39	18·41	34	17·12	19	17·32	7	18·29	1	19·00	2	10·00
May	186	6	19	11·48	11	16·17	5	12·80	1	8 00	3	7·33	2	10·00	5	10·00
June.....	180	13	45	18·55	8	16·13	5	14·80	2	8·00	—	—	1	12·00	4	13·50
July	186	14	30	17·20	8	8 50	2	8·00	—	—	1	9·00	—	—	1	2·00
August.....	186	27	31	13·06	6	7·50	4	11·00	—	—	—	—	—	—	2	12·50
Year....	2190	164	318	16·05	196	12·58	256	10·63	87	10·04	93	11·05	29	13·17	85	17·14

Wind Table.

S.S.E.		S.		S.S.W.		S.W.		W.S.W.		W.		W.N.W.		N.W.		N.N.W.	
No. Observations.	Average Velocity.	No. Observations.	Average Velocity.	No. Observations.	Average Velocity.	No. Observations.	Average Velocity.	No. Observations.	Average Velocity.	No. Observations.	Average Velocity.	No. Observations.	Average Velocity.	No. Observations.	Average Velocity.	No. Observations.	Average Velocity.
3	8·67	—	—	—	—	2	18·00	1	42·00	3	30 67	8	20·75	60	23·27	16	13 88
18	21·56	25	16·04	5	13·20	4	17·50	4	20·25	7	13 00	2	20·00	13	14·92	8	11·37
8	17·77	7	20·30	—	—	—	—	—	—	—	—	—	—	5	24·20	10	30·30
30	22·27	25	26·44	1	16·00	1	7·00	—	—	1	5·00	—	—	6	18·00	8	19·50
15	25·26	9	19·22	8	10·00	1	12·00	3	4·67	—	—	2	17·50	14	15 21	13	17 31
13	20·30	2	8·50	9	19·00	2	6·00	—	—	1	18·00	1	19·00	1	23·00	2	21·50
4	9·75	9	21·44	23	23 30	2	14·50	1	8·00	3	8·00	5	10·40	1	12 00	5	19·60
3	9 67	4	16·50	12	13·42	20	26·15	5	17·80	—	—	—	—	1	1·00	5	15·20
14	13·79	64	21·86	26	18·85	6	12·67	—	—	1	4·00	3	7·67	10	12·20	10	15·20
13	17·77	31	12·81	3	4·33	—	—	1	6·00	4	6·00	3	8·00	14	18·64	33	16 21
4	10·50	94	19·88	4	6·75	1	5·00	2	5·00	3	4·00	2	9·50	1	4·00	19	21·00
34	19·32	27	12·92	4	7·25	6	3·83	—	—	2	1·50	2	12·00	15	10·33	26	15·43
159	19·18	297	19·79	95	16·62	45	18 51	17	15·27	25	10·76	28	13·64	141	10·00	155	17·59

TABLE XVIII.—Stupart's Bay, Station No. 4—

Months.	Observations.	Calms.	N.		N.N.E.		N.E.		E.N.E.		E.		E.S.E.		S.E.	
			Number.	Average Velocity.	Number.	Average Velocity.	Number.	Average Velocity.	Number.	Average Velocity.	Number.	Average Velocity.	Number.	Average Velocity.	Number.	Average Velocity.
1885.																
September..	180	9	27	11·2	1	6·0	18	7·5	4	6·0	20	13·6	5	11·2	13	10·5
October	186	8	17	16 0	3	11·3	4	4·3	—	—	7	10·4	2	2·0	16	11·6
November...	180	3	9	10·7	3	5·7	1	3·0	5	12 0	14	17·3	7	2·1	1	18·0
December...	186	20	—	—	1	12·0	1	31·0	—	—	7	15·9	6	22·2	6	16·8
1886.																
January	186	30	2	12·5	—	—	1	6·0	2	10·0	9	11·2	4	11·0	—	—
February ...	168	13	—	—	4	8·5	2	10·5	2	12·0	6	7·5	4	15·5	2	7·5
March	186	63	5	7·6	—	—	2	13·0	—	—	2	2·5	—	—	5	17·0
April	180	15	5	11·0	1	10·0	2	3·5	2	17·5	2	2·0	10	11·9	1	4·0
May	186	24	13	11·9	4	8·5	3	8·3	4	7·5	9	9·9	21	15·7	17	12·2
June	180	38	15	11·3	5	10·2	3	10·7	2	12·5	14	5·9	3	2·3	1	9·0
July..	186	75	14	9·7	7	7·3	3	6·0	6	1·8	21	3·3	13	2·3	1	1·0
August.....	186	40	15	8·7	7	6·9	2	9·0	6	6·3	8	2·8	10	3·3	4	2·5
Year	2190	338	122	11·3	36	9·6	42	8·0	33	8·1	119	9·4	85	10·1	67	11·5
September (15 days)	90	5	4	110·6	4	6·2	—	—	—	—	7	19·4	10	12·2	4	10·8

1st September, 1885, to 15th September, 1886.

S.S.E.		S.		S.S.W.		S.W.		W.S.W.		W.		W N.W.		N.W.		N.N.W.	
Number.	Average Velocity.	Number.	Average Velocity.	Number.	Average Velocity.	Number.	Average Velocity.	Number.	Average Velocity.	Number.	Average Velocity.	Number.	Average Velocity.	Number.	Average Velocity.	Number.	Average Velocity.
5	7·4	3	48·0	—	—	1	4·0	2	17·0	3	29·0	17	27·6	33	16·4	19	15·5
10	17·3	3	8·7	3	11·0	7	12·6	8	8·1	22	8·1	24	9·4	30	13·5	22	14·5
—	—	—	—	—	—	1	20·0	5	5·0	26	12·5	34	10·6	32	11·6	39	17·4
4	21·8	8	14·4	5	11·6	6	8·3	11	8·9	21	11·7	31	10·1	35	13·9	24	22·4
—	—	2	15·0	—	—	11	10·0	16	14·8	35	19·6	25	7·2	27	17·7	22	20·5
—	—	—	—	1	11·0	2	1·0	16	14·9	25	7·8	29	6·7	30	16·4	32	23·4
5	7·8	3	4·4	4	11·0	7	10·4	7	19·4	11	9·3	13	5·2	32	24·0	27	13·9
5	2·4	4	7·7	5	4·2	7	5·1	3	4·7	11	8·1	9	6·3	38	14·3	60	21·8
7	6·3	3	3·4	2	11·5	3	8·7	12	15·8	13	11·8	9	4·4	21	10·6	21	12·7
1	1·0	1	1·0	4	6·5	—	—	4	8·0	8	12·0	8	11·5	44	21·3	29	18·3
4	1·3	—	—	—	—	3	8·7	2	18·0	6	13·7	7	8·0	11	14·5	15	13·7
2	5·0	3	3·0	5	3·0	5	6·2	14	17·8	13	11·1	1	8·0	36	19·1	15	15·1
43	9·7	30	8·2	29	8·0	53	8·8	100	13·5	194	12·3	207	10·0	369	16·5	323	18·6
—	—	4	3·2	2	5·5	2	5·5	4	10·5	12	23·0	15	16·1	11	12·4	6	10·5

TABLE XIX.—Wind Table, Station No. 5

Months.	Observations.	Calms.	N.		N.N.E.		N.E.		E.N.E.		E.		E.S.E.		S.E.	
			Number.	Average Velocity.	Number.	Average Velocity.	Number.	Average Velocity.	Number.	Average Velocity.	Number.	Average Velocity.	Number.	Average Velocity.	Number.	Average Velocity.
1885.																
September..	180	5	15	10·66	31	14·87	34	11·41	3	8·66	7	10·86	4	12·25	7	14·86
October.....	186	11	23	9·26	3	9·66	18	7·22	...	.....	19	9·47	5	14·40	17	10·57
November..	180	2	13	8.77	5	3·00	22	10·19	7	10·57	31	9·61	4	9·00	13	16·38
December...	186	44	5	22·80	6	23·83	18	17·56	3	18 00	11	24·27	1	15·00	5	16·00
1886.																
January.....	186	49	6	14·66	—	—	3	5·33	3	26·33	10	10·20	1	7 00	1	13·00
February ...	168	47	14	11·71	2	11·00	12	16·33	2	25·50	3	12·33	.....	.....	....	.....
March	186	11	24	18·75	8	4·88	25	10 48	1	3·00	2	5 00	2	8·50	6	11·00
April	180	8	26	16·69	2	15·50	10	14·60	4	16·75	9	11·89	1	20·00	2	8·00
May	186	9	31	21·48	4	11·00	21	11·76	3	19·67	17	16·89	6	14·33	6	15·67
June	180	29	30	14·90	4	16·75	23	10·35	1	4·00	10	4·70	4	4·25	12	3·50
July	186	13	5	8·80	8	10·12	66	11·52	4	6·00	12	5·25	2	6·00	2	2·50
August	186	24	8	10·88	6	11·00	38	11·29	10	5·50	9	8·33	6	4·50	15	6·53
Year.....	2190	252	200	14·86	79	12·63	290	11·56	41	12·10	140	11·06	35	9·94	86	10·58

—1st September, 1885, to 1st September, 1886.

S.S.E.		S.		S.S.W.		S.W.		W.S.W.		W.		W.N.W.		N.W.		N.N.W.	
Number.	Average Velocity.	Number.	Average Velocity.	Number.	Average Velocity.	Number.	Average Velocity.	Number.	Average Velocity.	Number.	Average Velocity.	Number.	Average Velocity.	Number.	Average Velocity.	Number.	Average Velocity.
3	14·00	9	13·33	6	9·33	5	5·60	.....	.....	30	24·16	4	11·75	12	10·40	5	7·20
1	5·00	12	9 42	1	10·00	13	12·61	2	16·00	38	8·79	8	5·50	12	5·42	3	6·67
2	9·00	2	5·00	.....	.....	22	18·73	5	17·20	33	14·24	2	2·00	13	13 00	4	6 50
1	12·00	14	22·43	4	18·00	24	13·33	10	12·40	36	9.67	.....	.....	3	5·00	1	3 00
1	18·00	14	16·43	10	18·20	36	18·61	15	23·80	33	11·91	1	6·00	3	25·00	.....	.....
...	.....	2	21·00	1	10·00	23	17·43	11	10·18	40	8·77	3	5·67	7	6·43	1	12·00
3	22·33	2	21·00	6	18·33	37	16·16	9	16·89	33	6·85	9	6·00	6	9·00	2	13 00
...	....	2	14·50	3	12·00	20	15 05	13	11·15	52	9 25	9	6·22	18	7·61	1	14 00
1	19·00	14	13·00	5	12·40	32	17·00	8	13·12	18	10·39	3	5·00	5	13·80	3	11 33
...	.....	4	10·00	5	14·50	20	11·65	9	13·00	19	13·47	3	21·00	7	9·14	.....	.....
2	6·00	6	9·83	7	10·86	31	16·29	4	16·75	15	10·87	2	16·50	6	15·83	1	13 00
3	6·00	5	7·00	4	15·00	29	15·89	6	12·17	19	14·47	2	13 50	1	5·00	1	10 00
17	12·41	86	14·14	52	14·36	292	13·59	92	11·01	366	10·42	46	7·82	93	9·06	22	8 23

TABLE XX.—Wind Table, Digge's Island, Station No. 6

Months.	Observations.	Calms.	N.		N.N.E		N.E.		E.N.E.		E.		E.S.E.		S.E.	
			Number.	Average Velocity.	Number.	Average Velocity.	Number.	Average Velocity.	Number.	Average Velocity.	Number.	Average Velocity.	Number.	Average Velocity.	Number.	Average Velocity.
1885.																
September..	180	5	15	13·11	7	11·71	22	17·81	31	21·08	9	14·55	6	15·33	7	12·28
October.....	186	8	13	10·84	7	10·57	14	13·92	1	5·00	9	14·00	11	14·81	23	16·21
November..	180	9	7	17·57	7	6·57	17	20 35	12	28·58	10	11·50	9	9·11	33	20·57
December..	186	12	3	35·33	5	25·80	11	33·90	8	34·50	1	25·00	7	20·71	27	21·59
1886.																
January.....	186	9	3	24·66	...	.....	7	17·14	4	17·77	5	13·60	2	28·00	28	10·39
February ...	168	14	15	11·73	2	15·00	12	16·75	9	30·88	1	5·00	2	22·00	27	9 62
March.....	186	13	13	29·07	7	19·57	14	25·92	16	19·06	7	12·00	6	11·83	11	19·27
April	180	7	21	12·85	9	15·77	15	19·20	8	13·00	6	24·33	3	16·66	9	20·33
May.....	186	4	10	15·40	7	17·00	13	22·92	12	23·75	3	16·66	4	16·75	12	32·41
June	180	20	23	11·95	12	13·66	16	16·00	16	15·81	3	6·66	.....	.....	6	7·00
July.....	186	15	6	9·83	4	8·50	25	20 52	15	18·53	3	7·66	10	13·20	20	8·00
August.....	186	17	3	4·00	9	14·44	16	25·68	17	18 94	9	18·44	2	7·50	3	5·33
Year.....	2190	133	132	14·88	76	14·30	182	20·63	149	21·47	66	14·53	62	14·79	206	11·08

—1st September, 1885, to 31st August, 1886.

S.S.E.		S.		S.S.W.		S.W.		W.S.W.		W.		W.N.W.		N.W.		N.N.W.	
Number.	Average Velocity.	Number.	Average Velocity.	Number.	Average Velocity.	Number.	Average Velocity.	Number	Average Velocity.	Number.	Average Velocity.	Number.	Average Velocity.	Number.	Average Velocity.	Number.	Average Velocity.
5	21·60	7	24·14	2	24·50	9	14·22	3	16·33	7	26·71	11	21·45	16	19·81	18	14·72
15	21·40	12	13·75	10	13·60	13	20·46	5	7·00	1	10·00	18	12·38	20	9·65	6	5·66
9	14·88	7	16·28	6	13·00	12	20·50	6	18·00	7	17·28	3	12·66	17	14·41	9	21.44
26	25·26	20	11·75	16	15·62	7	16·28	9	17·22	13	13·76	5	15·80	7	17·14	9	15·66
36	15·52	33	17·06	25	17·96	16	21·18	4	24·00	7	8·57	1	9·00	4	34·25	3	21·66
30	13·46	13	13·84	10	23·00	3	27·00	...	.....	5	17·40	6	10·50	8	14·12	11	14·18
49	15·28	21	14·38	7	20·15	9	11·33	...	.....	.....	.....	.....	.....	5	7·20	7	14·14
13	15·38	14	14·07	4	19·25	3	14·00	3	9·33	15	12·00	14	11·14	10	15·20	26	11·57
18	22·44	15	17·73	14	18·21	17	15·82	6	10·83	15	11·73	4	15·00	16	13·37	16	25·31
17	7·11	16	7·75	2	14·00	7	8·71	2	7·50	12	11·58	3	5·33	8	11·62	17	9·52
28	8·53	22	11·13	3	6·00	2	4·00	4	10·00	1	11·00	5	11·80	15	8·66	8	10·37
18	10·50	37	11·48	16	17·50	1	7·00	3	7·00	14	7·85	6	11·83	5	5·00	10	8·20
264	15·46	217	13·75	115	17·31	99	16·79	45	13·60	97	12·98	96	13·14	131	13·54	140	14·16

TABLE XXI.—Showing the number of days in each month, at each Station where the Velocity of the Wind equalled a Gale (30 miles an hour and upwards.)

Months.	Belle Isle.	Port Burwell.	Ashe Inlet.	Stupart's Bay.	Nottingham Island.	Digges Island.
1885.						
September	.....	.....	.....	8	5	9
October	16	8	5	4	0	6
November	18	7	9	3	5	6
December	22	12	12	8	4	13
1886.						
January	17	23	10	8	3	5
February	19	17	9	8	3	5
March	21	16	4	6	4	7
April	17	19	7	5	4	6
May	5	14	10	0	4	2
June	7	12	9	3	0	2
July	6	13	8	4	0	4
August	17	10	5	4	0	5
September	4	17	8	.....	.....	.....
Year	169	168	96	61	32	70

TABLE XXII.—Showing the number of hours of Fog observed at the Stations named.

Months.	Belle Isle.	Port Burwell.	Ashe Inlet.	Stupart's Bay.	Nottingham Island.	Digges Island.	Churchill.
1885.							
October	152	8	64	13	12	12	48
November	88	0	0	0	0	28	96
December	32	0	0	10	0	0	72
1886.							
January	168	0	0	60	0	0	48
February	144	0	0	43	0	0	0
March	312	0	12	74	0	8	0
April	24	28	4	35	4	16	42
May	216	24	44	59	12	76	—
June	248	204	60	68	20	124	44
July	368	44	92	147	56	188	8
August	104	196	88	40	80	208	*16
September	136	26	—	—	—	—	—
Year	1,992	530	.....	.....	.....	660	.....

*1st to 14th only.

TABLE XXIII.—Showing the number of hours Snow at the several Stations named.

Months.	Belle Isle.	Port Burwell.	Ashe Inlet.	Stupart's Bay.	Nottingham Island.	Digges Island.
1885.						
September	0	41	13	86	55	58
October	71	60	48	110	81	77
November	35	34	39	105	87	40
December	49	58	86	144	203	57
1886.						
January	98	8	48	95	78	5
February	136	36	40	113	71	19
March	208	31	8	76	56	95
April	104	3	30	139	49	94
May	25	10	52	86	114	132
June	0	15	20	45	15	0
July	0	0	0	0	0	0
August	0	0	0	0	0	0
September	40	34	—	—	—	—
Year	766	296	384	999	809	577

TABLE XXIV.—Meteorological Observations, H.M.S. Fury—Capt. Sir Ed. Parry, R.N.

—	Temperature.				Position.
	Max.	Min.	Mean.	Sea W	
1821.					
June	53·5	30·	40·45	39·36	England to Hudson's Straits.
July	50	29·	35·38	31·82	Hudson's Straits.
August	48·	28·	36·60	32 22	Upper Hudson's Straits to Vanseltart Isle.
September	42·	20·	31·06	31·99	Vanseltart Isle to Lyon Inlet.
October	32·5	—13·	12·51		Winter Harbour.
November	28·	—20·	7·75		do
December	2·	—29·	—12·94		do
1822.					
January	— 6·	—37·5	—22·96		do
February	— 4·	—37·	—24·97		do
March	13·	—35·	—11·64		do
April	29·	—12·	5·51		do
May	46·	— 5·	23·09		do
June	50·	20·	33·97		do
July	54·	30·	36·34		Winter Island to Straits Fury and Hecla.
August	50·	27·	33·68		Straits of Fury and Hecla.
September	37·	11·	24·45		Straits of Fury and Hecla to Igloolick.
October	29·	— 9·	12 79		Igloolick.
November	8·	—32·	—19·37		do
December	—10·	—43·	—27·80		do
1823.					
January	+22·	—45·	—17·07		do
February	21·	—43·	—20·41		do
March	4·	—41·	—19 75		do
April	32·	—25·	— 1·68		do
May	49·5	— 8·	24·85		do
June	52·	8·	32·16		do
July	59·	30·	40·04		do
August	55·	24·	37·77		do to Winter Island.
September	51·	23·	33·76		Lyon Inlet to Cape Farewell.
October					

TABLE XXV.—Weekly Abstract of Observations taken on board Dominion Steamer "Alert"—June to October, 1886.

Weeks ending	Barometer.				Temperature.				Hours Rain.	Hours Snow.	Hours Fog.	Observations Wind, 30 miles and over.
	Mean.	Highest	Lowest.	Range.	Mean.	Max.	Min.	Range				
1886.												
July 1	29·793	30·160	29·492	·668	48·84	57·2	38·5	18·7	22	.....	56	4
do 8	·756	·070	·509	·561	36·63	48·0	33·0	15·0	26	16	38	5
do 15	·787	29·984	·420	·564	38·42	48 8	32·5	16·3	18	.....	28	.....
do 22	·664	·912	·390	·522	38·63	42·5	32·0	10·5	12	.....	22	1
do 29	·727	·953	·502	·451	40·71	53 0	36·0	17·0	36	.....	38	.....
Aug. 5	·924	30·192	·702	·490	49·42	84·0	39·0	45·0	14	.....	40	6
do 12	·824	29·978	·606	·372	53·68	71·0	44·0	27 0	20	.....	2	.....
do 19	·807	30·101	·355	·746	55·90	76·0	43·0	33·0	8	.....	12	.....
do 26	·727	·101	·141	·960	46·94	61·0	39·0	25·0	14	.....	32	6
Sept. 2	·742	29·938	28·873	1·125	39·52	52·0	35·5	16 5	64	.....	38	9
do 9	·851	30 134	29·234	·900	36·92	44·0	32·0	12·0	30	10	10	13
do 16	·578	·055	·120	·935	35·36	42·3	32 0	10·3	14	6	10	20
do 23	·642	·074	28·857	1·217	46·23	43·2	27·6	15·6	12	2	18	23
do 30	·935	·233	29·403	·830	34·49	45·0	23·5	16·5	8	2	.....	7
Oct. 7	·676	·275	·017	1·258	39·95	50 0	32·0	18·0	22	2	4	2
Voyage.	29·762	30·275	28·857	1·418	42·776	84·0	27·6	56·4	320	38	348	96

Table XXVI.—Temperature of the Sea.

Date. — Months.	Position of Ship. Lat. N.	Long. W.	Sea Temperature.	Date. — Months.	Position of Ship. Lat. N.	Long. W.	Sea Temperature.
	° ′	° ′			° ′	° ′	
June 25...	44 54	61 20	54·02	Aug. 18...	.....	.....	56 52
do 26...	46 05	59 18	51·86	do 19...	.....	.....	54 29
do 27...	47 49	59 46	50.52	do 20...	.....	.....	50 63
do 28...	49 23	59 05	48·83	do 21...	.....	.....	43·74
do 29...	51 30	56 42	44·87	do 22...	.....	.....	42 33
do 30...	53 22	55 22	39·53	do 23...	.....	.....	41·82
do 31...	.....	.....	.....	do 24...	62 37	89 36	44·35
July 1...	56 59	59 49	37·93	do 25...	61 18	88 09	42·11
do 2...	56 59	59 49	34·13	do 26...	61 16	82 25	41·33
do 3...	57 52	61 17	35·53	do 27...	60 58	85 18	40·08
do 4...	.....	.....	34·76	do 28...	62 06	83 44	40·31
do 5...	60 46	63 02	32·30	do 29...	62 43	57 52	39 18
do 6...	60 58	64 08	32·53	do 30...	Port Laperrière.....	.....	37·46
do 7...	60 20	64 00	31 16	do 31...	.....	.....	37 83
do 8...	60 02	63 33	31 23	Sept. 1...	.....	.....	38·15
do 9...	61 03	64 41	32 76	do 2...	.....	.....	36 69
do 10...	61 27	67 38	35·58	do 3...	.....	.....	36 14
do 11...	62 22	71 16	36 06	do 4...	.....	.....	37 96
do 12...	62 52	73 09	33·52	do 5...	.....	.....	35·63
do 13...	63 04	74 03	34·35	do 6...	.....	.....	33 88
do 14...	62 56	75 12	32·48	do 7...	Left port.....	.....	34·93
do 15...	63 00	76 46	31·21	do 8...	Port DeBoucherville.....	.....	32·46
do 16...	63 00	77 01	30 76	do 9...	62 59	75 05	32·83
do 17...	62 58	77 14	31 23	do 10...	62 54	32 32	33 00
do 18...	63 04	77 05	31·46	do 11...	.....	.....	33 02
do 19...	62 48	77 29	30·43	do 12...	Ashe Inlet	.....	33·72
do 20...	Port Laperrière.....	.....	30 32	do 13...	.....	.....	32·58
do 21...	.....	.....	31·10	do 14...	.....	.....	32·78
do 22...	.....	.....	31 48	do 15...	.....	.....	33 18
do 23...	.....	.....	32 08	do 16...	Running across Straits	.....	33 93
do 24...	.....	.....	33·46	do 17...	Stupart's Bay.....	.....	34·42
do 25...	62 39	78 53	30·82	do 18...	.....	.....	34·57
do 26...	62 47	78 58	33·93	do 19...	.....	.....	34 05
do 27...	61 45	82 06	34 60	do 20...	.....	.....	33 53
do 28...	.....	.....	36 21	do 21...	.....	.....	34·04
do 29...	Fort Churchill	.....	43 12	do 22...	.....	.....	33 57
do 30...	.....	.....	50·31	do 23...	.....	.....	32·94
do 31...	.....	.....	48·43	do 24...	.....	.....	32·24
Aug. 1...	.....	.....	50·17	do 25...	Left the Bay	.....	32·49
do 2...	.....	.....	51 42	do 26...	60 39	65 39	32·69
do 3...	.....	.....	55·75	do 27...	Port Burwell.....	.....	32·90
do 4...	.....	.....	49·73	do 28...	.....	.....	33·41
do 5...	58 05	91 30	38·75	do 29...	Left anchorage.....	.....	34·92
do 6...	57 11	... ..	48·67	do 30...	Skynner's Cove.....	.....	35 67
do 7...	57 11	92 14	48 03	do 31...	.....	.....	.....
do 8...	57 11	92 16	49·04	Oct. 1...	Left Skynner's Cove.....	.....	34·69
do 9...	.....	.....	49·66	do 2...	58 50	59 51	34 98
do 10...	.....	.....	50·63	do 3...	56 13	57 10	36·69
do 11...	.....	.....	50·36	do 4...	53 50	55 18	37·50
do 12...	.....	.....	48·64	do 5...	51 44	56 15	40·12
do 13...	.....	.....	46 96	do 6...	Forteau Bay	.....	43 18
do 14...	57 12	... ...	48 18	do 7...	49 41	58 43	44·33
do 15...	58 50	92 30	42·83	do 8...	Off Meat Cove	.....	49·31
do 16...	Churchill	.....	50·40	do 9...	Port Hawkesbury.....	.....	53·58
do 17...	.....	.....	55·21	do 10...	Halifax.....	.....	54 33

APPENDIX "A" TO HUDSON BAY REPORT.

Results of Tidal Observations at the Stations.

The tidal observations taken at the stations in Hudson Straits, were examined carefully, and periods of fifteen or thirty days selected, in which there were the fewest lacunae. These observations were plotted on profile paper, and curves drawn representing the tidal wave. The hourly readings were taken from the curve and reduced to barometer 28 inches, by adding a correction at the rate of one foot of height of tide to one inch of barometer.

The readings so reduced were abstracted in groups according to the system recommended by Professor Darwin, in his article on tides. The hourly means of these groups were then harmonically analysed, and the tidal constants reduced.

At the two stations in the centre of the Straits, Ashe Inlet and Stupart's Bay, the periods selected were the months of April and May respectively, during which time the Straits were completely covered with ice. At all other stations the periods selected were in the open season.

The following table gives the tidal constants, with the exception of A_o, which, as it only represents the height of mean tide on the gauge, is not necessary for tidal prediction.

M_2, is the principal lunar tide (semi-diurnal).
H_m, the mean semi-range of this tide.
$\varkappa_m$, the angle of retardation, called by Darwin *the lag*.
S_2, the principal solar tide (semi-diurnal).
H_s, the mean semi-range of this tide.
$\varkappa_s$, the retardation angle or lag.
K_2, the luni-solar, semi diurnal tide.
H^{II}, the mean semi-range.
K^{II}, the retardation angle or lag.
$\varkappa_1$, luni-solar diurnal tide.
H^{I}, mean semi-range.
$\varkappa^{I}$, retardation angle or lag.
P, solar diurnal tide.
H_p, mean semi-range.
$\varkappa_p$, retardation angle or lag.
O, lunar diurnal tide.
H_o, mean semi-range.
$\varkappa_o$, retardation angle or lag.

Tidal Constants for Hudson Straits Stations.

—		Port Burwell.	Ashe Inlet.*	Stupart's Bay.*	Nottingham Island	Port Laperrière.
Latitude		60° 24′ 45″·2 N.	62° 33′ N.	61° 35′ N.	63° 12′ N.	62° 34′ N.
Longitude		64° 46′ 00″ W.	70° 35′ W.	71° 32′ W.	77° 28′ W.	78° 1′ W.
M_2	H_m	7.122 ft.	10·995 ft.	9 022 ft.	4 736 ft.	3·09 ft
	κ_m	262° 55′·6	233° 52′·7	226° 58′·5	259° 34′	257° 25′
S_2	H_s	2·329 ft.	3·978 ft.	3 049 ft.	1·771 ft.	1·24 ft.
	κ_s	304° 43′·2	296° 23′·7	288° 59′·2	320° 30′	315° 58′
K_2	H''	0 635 ft.	1·084 ft.	0 831 ft.	0 483 ft.	0·34 ft
	κ''	304° 43′ 2	296° 23′·7	288° 59′·2	320° 30′	315° 58′
K_1	H'	0·476 ft.	0·516 ft.	0 468 ft.	0·218 ft.	0·14 ft.
	κ'	113° 49′·6	107° 41′ 4	102° 38′ 3	91° 24′	64° 20′
P	H_p	0 159 ft.	0·172 ft.	0·156 ft.	0·073 ft.	0 05 ft.
	κ_p	113° 49′ 6	107° 41′·4	102° 38′·3	91° 24′	64° 20′
O	H_o	0·190 ft	0·218 ft.	0·307 ft.	0·253 ft.	0·04 ft.
	κ_o	157° 21′·8	348° 48′	6o 2′ 6	16° 42′	126 00′

* Winter tides, Straits covered with ice.

Putting the above table in the form now generally used for the ordinary purposes of navigation, the results become:—

Port Burwell.

		H. M.
Time of H. W. F. and C		9 25
Mean luni-tidal interval		9 04
		Feet.
Mean rise and fall		14·24
do	springs	18·90
do	neaps	9·59

Ashe Inlet.

		H. M.
Time of H. W. F. and C		8 32
Mean luni-tidal interval		8 04
		Feet.
Mean rise and fall		22·00
do	springs	29·95
do	neaps	14·03

Stupart's Bay.

		H. M.
Time of H. W. F. and C		8 11
Mean luni-tidal interval		7 50
		Feet.
Mean rise and fall		18·04
do	springs	24·14
do	neaps	11·94

Port Deboucherville, Nottingham Island.

		H. M.
Time of H. W. F. and C		9 30
Mean luni-tidal interval		8 57
		Feet.
Mean rise and fall		9 47
do	springs	13·01
do	neaps	5·93

Port Laperrière, Digges Island.

		H. M.
Time of H. W. F. and C		.....
Mean luni-tidal interval		8 53
		Feet.
Mean rise and fall		6·18
do	springs	8·66
do	neaps	3·70

Nachvak Bay, Skynner's Cove.

From observations of times and height of high and low water.

		H. M.
Time of H. W. F. and C		7 08
Mean luni-tidal interval		7 01
		D. H. M.
Age, from graphic method		1 12 42
		Feet.
Mean rise and fall		3·69
do	springs	4·88
do	neaps	2·58

NOTE.—No correction for barometric changes was applied to these observations

Port Churchill.

	H. M.
Time of H. W. F. and C	7 06
Mean luni-tidal interval	6 44
	Feet.
Mean rise and fall	11·7
do springs	15·5
do neaps	8·0

Marble Island.

Approximate results from two days' observations.

	H. M.
Time of H. W. F. and C	4 10
Mean luni-tidal interval	3 54
	Feet.
Mean rise and fall	9·00
do springs	12·00
do neaps	6·00

ANDREW R. GORDON.

APPENDIX

Copy of Table of Experiments for ascertaining the Depth of Frost and Thaw pene Height above sea

No.	Year.	Date.	Description of Locality.	Wet or Dry.	Depth of Snow.
					Inch's
1 to 7	1879-86	Jan., Feb and Mar.	Depth of ice in channel of River Hayes		
8 to 10	1879	Aug. 25...	200 yds. W., 300 yds. N. W., and 300 S. of York; swamp.		
11 to 13	1880	do 10...	100 yds S, 100 S. W., and 300 S of York; swamp...		
14	1881	July 23...	400 yds. N. of York, grave, alluvial 20 inches, white clay, dense blue clay.	Dry	
15 to 20	1882	Sept. 10...	500 yds. N. of York, old Indian burial ground, 6 graves opened, alluvial 4 feet, sandy clay.	do	
21 to 485	1882-83	Dec., Jan. and Feb	Nelson River (mouth of and 30 miles up) 7 miles from York, due North; 485 cross soundings taken by surveyors to ascertain channel of river; white clay, sand, blue clay.		
486	1883	Sept. 10...	River Hayes, bank exposed to full intensity of frost...	Dry	
487	1884	July 15...	Land slip, River Hayes		
488-491	1884	Aug. 30...	600 yds. N. of York, 4 graves opened, alluvial 40 inches, sandy clay.		
492	1885	April 14...	400 yds. N. of York, grave, alluvial 22 inches, white clay, blue clay.	Very dry....	15
493	1885	June 18...	Land slip, River Hayes		
494	1886	April 28...	N. of York, open ground, mossy grass	Dry	
495	1886	May 4...	400 yds. N. of York, grave, alluvial 21 inches, &c.	Wet	20
496	1886	do 28...	York, garden soil	Wet and dry.	
497	1886	do 28...	400 yds. N of York, grave, alluvial 21 inches, &c....	Wet	
498	1886	do 31...	1,000 yds. S. of York, swamp	do	
499	1886	June 4...	York, grave, alluvial 23 inches, &c.	Dry	
500	1886	do 4...	Swamp around York		
501	1886	do 14...	Bank of River Hayes, land slip, white clay and mud		
502	1886	do 14...	Shore of River Hayes, sand and mud		
503	1886	do 14...	York, garden soil	Wet and dry.	
504	1886	do 23...	Grave, alluvial 2 inches, &c		
505	1886	do 25...	450 N. of York, new lime kiln, sandy clay, 20 feet.	Very dry	
506	1886	do 26...	†A clearing	Swampy	
507	1886	Aug. 30...	Severn, H. B. post, 300 miles S W of York; cutting for jetty (40 feet in length and 15 feet in depth) shelving backwards and upwards to surface.	Dry	
508	1886	July 1...	Within 20 yds. of experiment, 506	Now dry	
509	1886	do 1...	Swamp around York.	Wet	
510	1886	do 3...	do (two days' rain)	do	
511	1886	do 7...	Within clearing, experiment 506, fine weather	Dry	
512	1886	Aug. 2...	Swamp around York	Wet	
513	1886	do 2...	Open ground around York..	Dry	

†The above clearing is the most bare and bleak in the neighborhood of York; it is nearly at all so that its soil is fully exposed to the greatest degree of frost penetration possible, not only from above a trench dug (10 feet in length) down to the non-frozen sub-soil with the result detailed in No. 506. depth of frost penetration in and around York, and may certainly be ranked as perpetual ice, but upon ground, I may mention that I had an Indian working hard for three days to obtain this information.

Note.—The varying nature of the instrument sometimes employed (skull and screw augers of of the measurements in the foregoing experiments.

B.

tration, York Factory, Hudson's Bay, Latitude 57° N., Longtitude 92° 26' W. level, 51 feet.

Frost Penetration.	Superficial Thaw.	Total Depth of Boring.	Rain and Snow-fall for mean of year.		Thermometrical readings for mean of year.	Explanatory Remarks.
		Feet	Rain.	Snow.		
Avg. 6 ft. 6 in.	.....	.....	.....	.....	.....	Lowest, 5 ft. 6 in.; highest, 7 ft.
.....	.....	33	20·92	43·70	17·45	No frost found at 33 feet.
.....	.....	33	22·84	57·80	15·75	do 33 do
38 inches.	28 inches.	10	21·78	51·60	19·19	do 10 do
.....	.....	10	23·21	39·47	21·90	do 10 do
Avg. 5 ft. 10 in.	.....	.....	.....	.....	.....	Information courteously given me by H. Jukes, Esq., C.E., engineer in charge. Surveyors employed by Winnipeg and Hudson Bay Railway Co.
.....	.....	12	25·31	50·18	16·51	No frost found at 12 feet from above downwards, height of bank 34 feet.
.....	36 inches.	.....	24·27	47·46	15 08	
.....	.....	16	.....	.....	.....	No frost found at 16 feet.
33 inches.	Nil	17	21·18	41·86	15·01	do 17 do
.....	37 in., 29 in.	.....	.....	.....	.....	37 in. white clay, 29 in. blue clay.
.....	Avg. 1 inch	.....			Abt 16	
48 inches.	do 2 inches.	17				No frost found at 17 feet.
.....	7½ to 9 inches.	.....				Thaw dependent upon nature of ground; wet average 9 in., dry 7½ in.
40 inches.	2½ inches	.....				No frost found at 17 feet.
.....	10 to 12 inches	.....				
30 inches.	10 inches.	.....				do 18 do
.....	Avg. 12½ inches	.....				
.....	28 inches.	.....				
.....	10 feet	.....				do 10 do
.....	Avg. 18 inches	.....				
31 inches.	do 14 do	18				do 18 do
3 do	65 inches.	.....				A lodgement of 3 inches of frozen water over clay bed at 65 inches.
8 feet.	14 do	21				
.....	.....	*15				*Excavation. No frost at 15 feet.
.....	30 inches.	.....				
.....	Avg. 36 inches	.....				
.....	37 inches	.....				
.....	Avg. 37¼ inches	.....				
.....	do 48 do	.....				
.....	40 inches.	.....				

Rain and snow to Aug. 2, 9 34 51·03

About 19·00

times freed from its winter's snow by the action of fierce easterly gales sweeping over Hudson's Bay, downwards, but from its position, laterally, therefore having selected this, the most exposed site, I had This last experiment is, in my opinion, conclusive, inasmuch as I consider it indicates the greatest a scale so small as to be wholly comprised within 10 acres. To give an idea of quarrying in frozen

different diameters and lengths, ice chisels, &c.) explains the somewhat arbitrary appearance of some

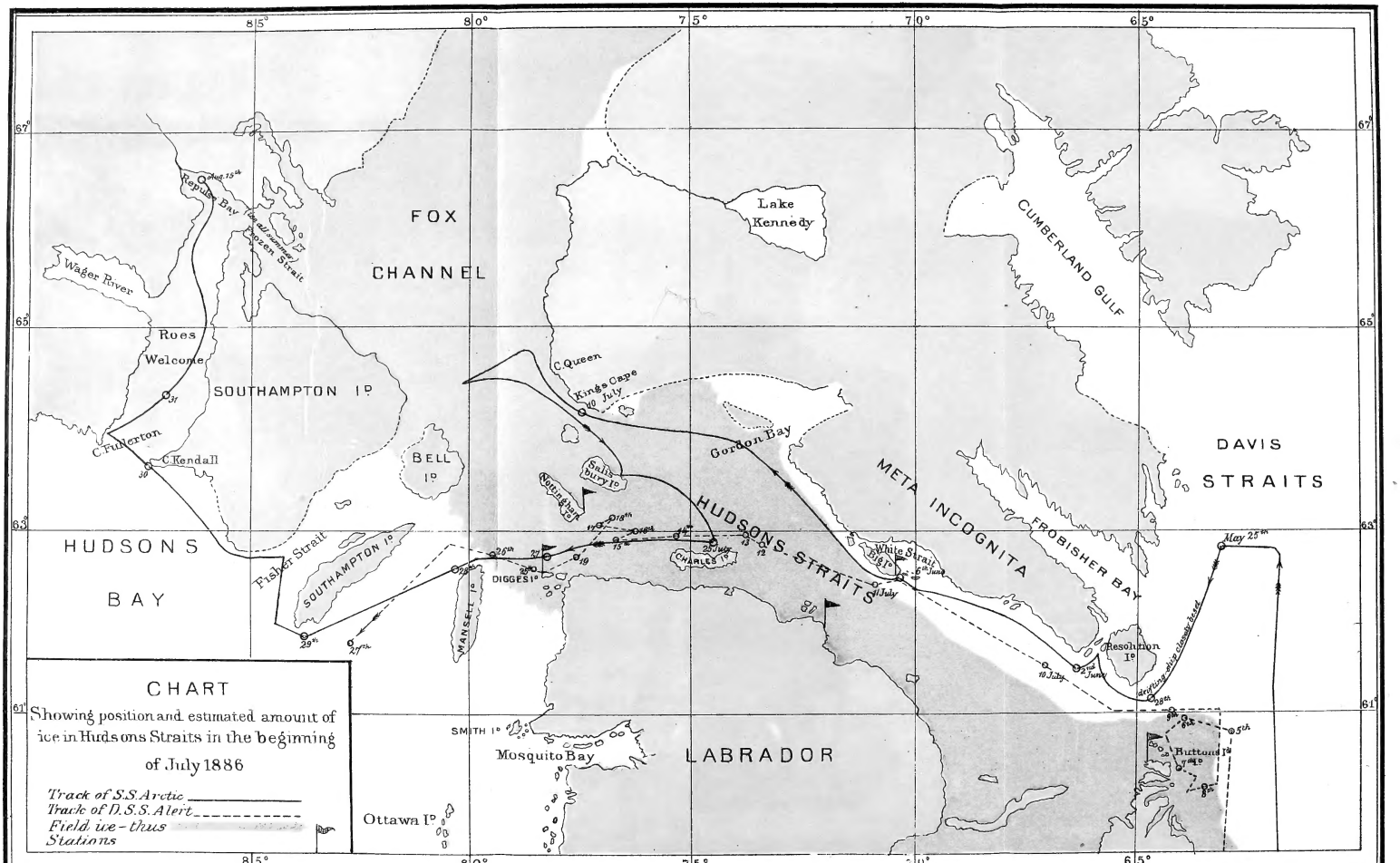
CHART
Showing position and estimated amount of ice in Hudsons Straits in the beginning of July 1886
Track of S.S. Arctic
Track of D.S.S. Alert
Field ice - thus
Stations
FOX CHANNEL
Lake Kennedy
CUMBERLAND GULF
DAVIS STRAITS
META INCOGNITA
FROBISHER BAY
HUDSONS STRAITS
HUDSONS BAY
SOUTHAMPTON Ip
BELL Ip
SOUTHAMPTON Ip
Fisher Strait
Wager River
Rowes Welcome
C. Fullerton
C. Kendall
C. Queen
Kings Cape
10 July
Gordon Bay
Salisbury Ip
Nottingham Ip
DIGGES Ip
MARSELL Ip
CHARLES Ip
White Strait
Resolution Ip
May 25th
SMITH Ip
Mosquito Bay
LABRADOR
Ottawa Ip
Button Ip
Aug. 15th
Frozen Strait
85°
80°
75°
70°
65°
67°
65°
63°
61°